

ECO FRIENDLY ARCHITECTURE IN ECO TOURISM

An illustrative study of Eco tourist architecture in the tropical environment with special reference to Sri Lankan context

Dissertation submitted in partial fulfillment of the Master of Science in Architecture
Department of Architecture

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Abstract

The pace of development in countries within the tropical region is among the fastest in the world. Yet many of these nations still depend heavily on their natural resources. This today has led to a conflict: rapid development places an ever-increasing claim on scarce natural resources, which results in environmental degradation. On the other hand the effects on the ecological balance due to mankind's short sighted activities.

The key element in any sustainable development is to ensure that they are undertaken in an environmentally sound manner. Here the buildings are the main added contributor into the creation of imbalance in the natural environment. With the rise of the concept of eco tourism this has become more aggravated as it makes direct physical interaction within the nature. The built environment as the major physical component in eco tourism, which also contributes to give the character to the place, visualizes the significant role of the architect creating sustainable eco tourism friendlier towards the nature. But unfortunately in the contemporary practice of eco tourist architecture, though it needs to be exceptionally eco friendly, has lost the sensitivity mainly because of lack of understanding the design principles of eco tourism.

Finding the solution it convinced the necessity of the comprehensive understanding of eco friendly architecture, which is the total interpretation of design principles of eco tourism. Thus the study is initially attempted to make a broader understanding of eco friendly architecture, clearly defining the concept as a holistic approach of the green, eco sensitive, sustainable and ecological conceptions with their physical and psychological perception as a criteria to evaluate the design principles in a more elaborative manner.

Since the concept of eco tourism is highly elaborated in the tropical nature and its merged exclusive culture the examples are evaluated mostly within the tropical eco systems. Thus the study attempts to visualize how possibly viable eco tourism can be generated in Sri Lanka which has an exotic tropical nature enriched with an exclusive culture. Thus has given examples of some of the recent tourist products, which are developed within these natural and socio cultural settings making closer attitudes towards sustainable eco tourist architecture.

Acknowledgment

My sincere gratitude is due to many who contributed in the production of this Dissertation.

My special thanks goes to Professor Nimal De Silva, Head of the department of architecture and Architect Chris De Saram Senior Lecturer at University of Moratuwa, for encouraging me during the study by correcting and advising me taking their valuable time of their busy schedules.

Architects Vijitha Basnayaka and D. P. Chandrasekara my tutors for believing the worth of this study and guiding me by giving incisive comments and valuable criticisms, which helped me and gave pace to develop my thoughts and approach to this study.

I am profoundly great to Dr. L. S.R. Perera, the Senior Lecturer in the Department of Architecture, University of Moratuwa for all his guidance given at the beginning of the study.



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Great appreciation goes to Architect Sunil Gunawardana, Mr. Chandra De Silva; Managing Director Ranweli Holiday Village, Mr. Chandra Wickramasinge; Chairman of Connaissance de Ceylon Ltd, Mr. Hemantha Ratnayake; Operations Manager Kandalama Hotel and Mudiyanse Thennakoon at Ulpotha.

My warmest thanks goes to Rachitra and her Family and to my friends Udaya, Ashoka, Dilkushan and Madhuwanthi for their constant support given in numerous ways during the study.

Last but not least my greatest gratitude goes to my dear parents, sisters who were behind me encouraging all the time.



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Eco friendly architecture and the tropical environment



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Introduction



Topic Explanation _____

From the history the inter relation between mankind and the natural environment was the fundamental issue to ensure an architecture, which is ecologically sustainable, visually harmonious and physically comfortable. To achieve these, architecture from its primitive stage used natural materials and resources found in its own environment to enhance a sustainable or friendly architecture more towards the nature and the ecology. Thus the concept of *eco friendly architecture* evolved as the architecture, which not only used environmentally sensible materials and resources, but also which incorporated social and functional issues to satisfy the necessary needs.

When man became more and more personalized and socialized their day-to-day needs were radically changed. As these requirements became more and more complicated architecture too, had to interpret the needful socio functional aspects, to achieve the concept of eco friendly architecture. Thus envisage Richard Crowther's quote

*“Architecture will have to be viewed in an entirely new perspective, consistent with ecologic, social values and equity”.*¹

With the various developments, which take place daily on planet, people have become more and more busy physiologically and physically. As a result people are have become increasingly interested in finding environmentally peaceful and comfortable places to temporarily move away from their busy life styles. The concept of eco tourism developed as these people became more and more interested in traveling towards the nature more consciously, which conserves the environment and improves the welfare of the local people. Thus, simply, as in its definition, eco tourism is about creating sensible built spaces or eco tourist architecture called eco lodges to experience the nature, averting negative aspects on ecology, culture and aesthetics. This implicates that the concept of 'eco friendly' architecture is no longer new, but existed in the past as well.

It is critically evident that it is the mankind in the tropical part of the world that mostly experience this exclusive luxury environment and climatic conditions of the tropical

¹Crowther, Richard L. – 1992 – p4

environment. The warm tropical climate with its natural characteristics enhances outdoor living activities and gives greater importance to build a physically comfortable environment, which is a fundamental issue of eco friendly architecture.

It is this exclusive outdoor living comfort and the exotic natural environment has made an ideal setting for the concept of eco tourism. The tropical natural environment enriched with tropical eco systems and the tropical cultural environment facilitate the travelers a valuable set of environmental experience, as eco friendly architecture which is merged in the eco tourist architecture enhances a sense of place more consciously towards the nature.

Objective of the study _____

The concept of eco tourism, though it has become a popular event in the tourist industry in the tropics, most of the eco tourist architectural products are less sensitive towards its environment; merely a green labeling but totally away from the conceptual reality.



The theme of the concept of eco tourism, which is to experience the nature and the sense of place, indicates that physically built products should not be overpowered, but harmonize and enhance the nature. In reality the architecture found in the labeled eco tourism has become only an architectural product, which locates in a natural setting, reacting to the nature, but boosting itself as an expression of borrowed or copied element with some architectural forms, which is admired by the trade. The architecture in eco tourism as it explains is the creation of most sustainable eco sensitive built spaces designed to build a sense of place mainly enhancing the exotic nature of the environment without making any physical or visual impact to the ecology or eco systems. This implies that the architecture of eco tourism is not simply an interpretation or an application of conventional tourist architecture, but an issue, which needs deep thinking of eco friendly attitudes towards the environment.

In the contemporary practice of architecture, most of the products in the tropical climate merely reflects the work of eco friendly architecture, this implies not only to the tourist industry but also in the entire building industry, merely because people have moved to use artificial methods and applications to gain physical and visual comforts,

which results in having no sense of natural comfort of the tropical climate. This is mainly because of not only the lack of design understanding of eco friendly architecture, but also due to the reluctance to change the admired modern design forms and methods, which have no respect to the environment.

Further it is emphasized that the study of the concepts of the two subjects, the conceptual synthesis of eco friendly architecture and the eco tourism and the practicing of eco friendly architecture for eco tourism especially in the tropical climate will make the best combination to provide conceptually meant eco tourism in practice. Thus ultimate objective of the study is to make the correct understanding of these two concepts and also to emphasize the greater responsibilities of architects as the only professionals who deal with the subject to create a sustainable eco tourist architecture which makes not only and environmentally friendly physical elements but also a more economically viable products in tourism.

Justification



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At present the environment has become a controversial issue with its rapid degradation due to the increase of disruptive human interaction towards the nature. With the realization of the importance of the protection of environment, the human activities generated towards the nature is attempting to minimize and move away from the disruptive activities towards the environment and become more sensitive and friendly.

The concepts of eco tourism arise in the same manner to generate a sensitive traveling towards the natural areas. The evolution of the concept of traveling to the nature makes a deep intervention rather than the conventional traveling to the nature.

Though the concept of eco tourism means, “ **travel towards the nature more consciously**”, in reality the impact is much more significant than in the conventional tourism. This is mainly because as it makes deep intervention not only in the natural environment but also in the socio cultural environments.

But today in reality most eco tourist practices have lost the sensitivity towards the nature and the impact has become more significant than ever before. This is mainly due to the eco tourist industry's direct interaction with natural eco systems, which are extremely sensitive and greater in danger. This aspect is more acute when considering the tropical environment as eco tourism in this environment is highly elaborated directly on nature's sensitive belongings. Thus most of the eco tourist products no longer appear in their real conceptualities but simply highlight a commercialized tourism, which does not offer the real spiritual sense of eco tourism.

The principles of the concept of eco tourism; generating a sense of place, using sustainable design methods, having a carrying capacity, emphasize that the concept basically depends on sensitive design and planning implications. In other words a friendly architecture, which is responsible in creating conceptually, meant real eco tourism in practice. Thus gives evidence that architecture is the ultimate respondent for both the negative and positive results of the eco tourism. Therefore it is emphasized that the importance of the concept of eco friendly architecture is an architecture which makes both physical and psychological comfort while generating a spiritual sensitive enhanced environment without damaging it; the ultimate objective of eco tourism.

Methodology _____

The study initially began with a general knowledge of eco friendly architecture and its background. As the concept of eco friendly architecture has become one of the most highlighted issues in the field of contemporary architecture and also in the concept of eco tourism most information was gained by some latest media resources like the Internet and subsequently was followed by various literature surveys to broaden the knowledge of the subject.

Any building directly or indirectly at least has a slight impact upon the environment. With the changing world, it is the designers of these built forms should have a thorough knowledge and the sensitivity to change according to the climatic and environmental issues to generate eco friendly atmosphere. With the broad understanding gained by the

literature search on eco friendly architecture, the research was continued by conducting both formal and informal interviews with architects, engineers, tourist related personnel's, tourists, and various other relevant personnel's related to this research.

This research area in reality needs unlimited practical, theoretical and visual experience. It applied the same criteria to the study and required a comprehensive understanding of theoretical, practical and visual aspects. Having the basic understanding of eco friendly architecture both theoretically and practically, visits were made to identify various tourist architectural products such as the Kandalama hotel, La Kandyan, Ranweli hotel and Tea Factory to strengthen the understanding of eco friendly architecture of more towards the tourism industry. The photographic survey followed by a literature survey of visuals was done as a method of visually expressing the quality and the essence of a place.

Since in Sri Lanka there is no successful eco tourist product as such, subsequent visits were made to tourist products, which are developed, in various natural settings; the Ella Adventure park, Ulpotha and the Eco Nature park, which have closer attitudes towards eco tourist architecture; thus observations were done to examine the eco friendly architectural implications according to the study. These observations were done in to greater depth not only by simply observing the physical characters and interviewing people, but also by experiencing by living and experiencing in, to get the spiritual sense which was the most important aspect to understand the real sense of eco tourism.

Therefore the chapters of this study have been elaborated more consciously in accordance with the broader understanding of all the above aspect. Thus chapter one provides with a broader understanding of eco friendly architecture while its interpretations on eco tourist architecture is highlighted in chapter two. And finally in the third chapter highlights the promotability of eco tourist architecture in the Sri Lankan context giving possible examples to strongly elaborate and thus to offer an understanding of the study.

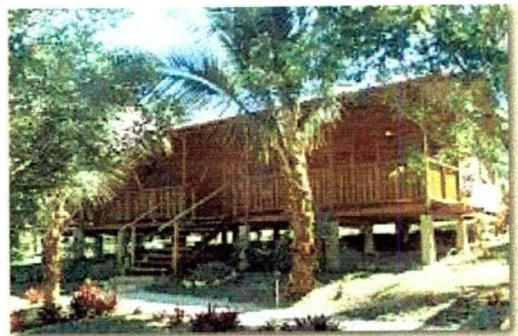
Scope and Limitations _____

Though the study mainly discuss about the eco friendly atmosphere, the main focus of it is to elaborate on eco tourist architecture in the tropical eco systems. Thus the physical and psychological perceptions of eco friendly architecture which is embodied in the holistic approach of green, sustainable, ecological conceptions, design strategies and adaptations as the interpretations of the perceptions are mostly illustrated to elaborate these highly boosted natural eco systems in the tropical climate. Therefore will make an easy understanding of the sustainability of eco tourist architecture, which is also highly elaborated in the tropical eco systems.

The eco tourist architecture though it is visualized in different attitudes, the study is subjected to discuss only the most distinctive formation or metaphors; the nature and adventure parks, villages and resorts which can be found in the tropical eco systems. The physical and psychological interpretations of eco friendly architecture have been used as criteria for education. The sustainability of these three major products in detail will help to get a total understanding of the philosophy behind the design principles of eco tourist architecture. To discuss these aspects examples of Sri Lankan context has been taken in to consideration in both natural and man made. The examples opened in to discussion in this study is considered as products of having a closer characteristics towards the three distinctive eco tourist metaphors and is subjected for evaluation to make a better understanding of the promotability of viable eco tourism in practice.



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Chapter One

Eco Friendly Architecture and the tropical environment



1.1 _____

Eco friendly architecture: The concept and evolution

The concept of “**eco friendly architecture**” appears as a fashionable term, which implies a ‘friendly’ approach towards the nature, and it’s ecological concepts. The term ecology is derived from the Greek root ‘*oikos*’ meaning ‘house’ combined with the root ‘logy’, meaning “the science of”.

Literally ecology is the study of the earth’s ‘house holds’ including plants, animals, microorganisms and people that line together as independent components. Further, this definition is not only concerned on organisms, but also with energy flows and material cycles on the lands, in the ocean, in the air and in freshwaters, making it more clear that “ecology” is the “study of the structure and functions of nature”. Thus the concept of “eco friendly architecture” is the architecture, which makes a friendly attitude towards the structure and functions of the nature.

In the history though man did not have any conceptual understanding of the concept of eco friendly architecture, the work of architects and designers simply reflected that they had captured the essence and the sensitivity of nature. One of the primitive architectural aspects, “of having a south facing cave rather than facing to north to keep off the sun and glare” is a fine example, which clearly explains a fundamental issue in the concept of eco friendly architecture.

(Figure – 1)

During this period, which can be categorized as the primitive era of eco friendly architecture, the contributions made by the human beings were very little. They used existing available materials from the nature as their needs were limited and was sufficient enough to cope with their requirements. They

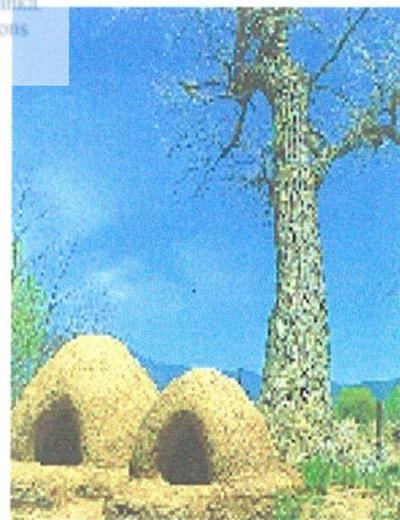


Figure - Primitive earth architecture respondent to the “Tropical Sun”

interacted with nature's belongings without exploiting them. These activities generated a sensitive friendliness towards the nature, and built up architecture, which was not only aesthetically pleasing but also psychologically and physically comfortable.

As time passed the conditions on planet earth changed radically. As a result during the era of vernacular traditional architecture, the people became more socialized and the contributions they made towards the nature in a friendly approach varied in scale and scope. But their work, embodied with rich cultural and traditional aspects emphasized eco friendly attitudes in architecture that made a symbiotic dialog, enhanced with socio, functional aspects, which was something beyond the climate and materials. (Figure -2)

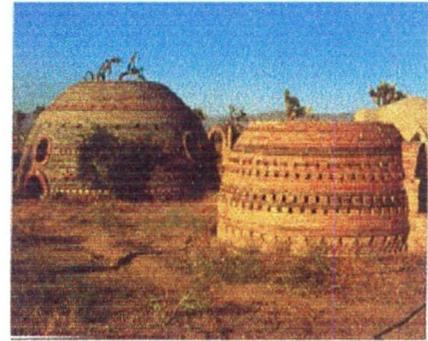


Figure 2 – Inspiration of the tradition in earth architecture

In the contemporary practice though the concept of eco friendly architecture has an inspiration of the past, it has managed to emphasize a holistic approach by using developed technical design resources, and offer a friendly manner to enhance the nature while satisfying the social and functional needs of the people.

Today the work of architects who do aim to build with ecology in mind have fallen into 2 camps; one who uses earth or organic forms and the others being “hi-techs”. But the importance and the challenge, which lies ahead of both these whether they are man made or natural, are that their ability to perceive an architecture, which can be ecologically friendly and be the panacea for all environmental ills.

1.1.1. _____

Relationship between the nature and eco friendly architecture

The nature consists of species categorized as both organic and inorganic. These, whether it's organic or inorganic have created a constant or a seemingly random order of their way of life. As the patterns of rivers and its flow, branches of trees, waves in the ocean, shape of the human bodies are entirely different from each other it is obvious that there is no strict order for them to be rigid or to exist as a pre determined geometric shape or be identical.

Despite all the changes and the developments, which have taken, place radically on earth and in the human history, it is obvious that a fundamental issue; that is the level of protection, which the man and woman needs, psychologically, from the nature has changed very little. It is here that the relationship of nature and architecture exist, as it is very important for the designers and planners to adopt the principles of their design process to retain the same orders of nature's belongings. Architects, as they did in the past, has to provide protection in this aspects environmentally, without exploitation of the nature and deal with problems related to human beings. (Figure – 3)

Thus emphasize that whether it is in the past or future, it must be sensible towards the nature rather than merely becoming exposed, have the ability to deal with classical problems of human beings and their relationship with the nature without exploiting it, and in a friendly manner. This can be gained by giving great thought regarding both; the architecture and the nature and enhance a eco friendly architecture which needs to gain a positive perception about the nature in the human thinking and not only to make it visually pleasing but also for it to be more romantic spiritual and sensitive to the nature.

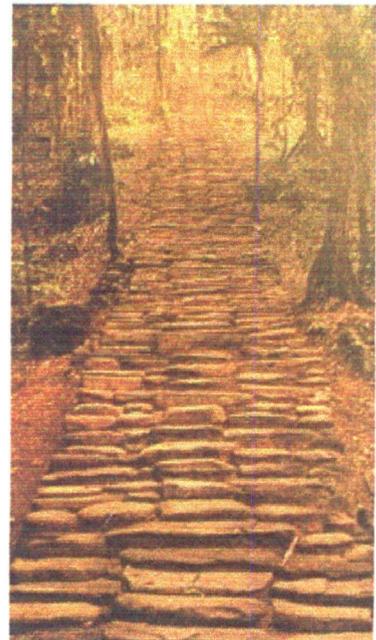


Figure 3- Built environment in harmony with nature

1.1.2 _____

Contemporary definitions of Eco friendly Architecture

The planet Earth and its belongings change radically day by day. At a time when earth, despite the “green revolution”, is undergoing seemingly irrevocable ecological breakdown, it is pertinent to consider architecture, which makes an attempt to avoid apocalyptic conclusions.

Eco friendly architecture, which is a fine answer for this criterion, is not just a pretty or convenient arrangement of built forms. It is the art of designing a building in a way that integrates the functional, psychological, climatic and aesthetic aspects to create a harmonious effect that both pleases the eye and the mind, and serves the purpose for which it is designed without any harm to the nature.

As John Former quotes;



“ The reek of nature and the man’s ability to reach new heights of creations is through making of nature, rather than trying to dominate it”²

In the contemporary definitions, eco friendly architecture makes a holistic approach of natural and socio functional aspects and integrates with many fundamental issues of the concepts of eco sensitive architecture, green architecture, sustainable architecture and organic architecture which are fashionable terms used to enhance the nature and the nature friendly activities. Therefore the key to success of an eco friendly built form is the approach of the attitude of eco friendly architecture in a holistic manner and its friendliness towards the nature than over powering.

But in reality the contemporary practice of architecture, as it has become more complex, the structural and physical planning methods has moved away from being friendly towards the nature, but has followed an ecologically spiritual perception.

² Former, J – AD VOL 67Jan 1997

As R. Crowther says,

*“ Design is best not as a casual exercise in space planning, aesthetics, structural, mechanical and electrical systems, but when it’s within an ecological and humanistic perspective”.*³

The development of human technical knowledge of contemporary architects has given great opportunities to practice more sophisticated eco friendly attitudes towards the environment and the ecology. The idea of Steven Johnson as

*“Contemporary building designers have a wonderful opportunity to assimilate ecological techniques in to the vocabulary, allowing them the freedom to design an architecture that makes symbiotically with the environment and enhance the lives of its inhabitants”,*⁴

further enhances the greater possibilities of generating Crowther’s Eco friendly architectural perceptions of the ecological and humanistic perspective in the contemporary practice in architecture.



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1.2 _____

Eco – friendly architecture and the tropical climate

The tropical climate prevails in the equatorial region extending up to the tropic of cancer towards the north and the tropic of Capricorn towards the south. This type of climate, with relatively high overall temperatures, bright sun shines and reasonable rainfalls are characterized by the incidence of variations of climates within its region as

- **Warm humid climate**
- **Desert climate**
- **Composite or monsoon climate**
- **Tropical upland climate**

(The detailed characteristics of this tropical climates is given in the table No-1)

³ Crowther, R – Ecology of Architecture 1992 – p9

⁴ Richard, S. J. – climatic Control by building design – p15

These natural climatic conditions greatly helped to create not only a sensible natural pleasing living environment, but also a sense of individuality of the local environment, which is simply an essence of eco friendly architecture.

The eco friendly approach in the tropical climate emerged from the history, as the tropical climate is enriched with natural resources, eco systems, forms and natural built materials that are considered as the essence for an eco friendly environment. These naturally reflected the 'sense of tropical nature'.

The most significant character of these in the tropics is the 'tropical sun', which helps to facilitate an exclusive tropical natural environment with the variety of exquisite eco systems ever found in the world. The tropical heat, as it generates a warm environment, together with the exotic out door nature, have resulted in indoor living patterns merely undesirable and outdoor living environment and activities predominantly popular. But as man's most fundamental requirement became 'the house', indoor living in the tropics became the most important issue as in other climates. Hence the greatest challenge in architecture in the tropical climates is to make a greater attempt to keep a comfortable cool environment indoors, as in the outdoor environment.

1.2.1. _____

Traditional aspects of eco friendly architecture in tropical climates

In the past designers were well versed with the varying climatic conditions and benefited from their advantages while overcoming the disadvantages given the limited resources available to them. More importantly the basic materials and design solutions changed little, and the change when it did come, came slowly giving them time in which to adjust it into their realm with the understanding of the following strategies of the traditional eco friendly architecture.

- **Timber and earth construction.**

Timber and earth was the most primitive eco friendly materials found on earth from the history. In most areas in the tropics, these materials were easily accessible within the site. The aesthetical positive aspects of such structures built out by combining these two types of materials were commonly used and gives a pleasing appearance as if it naturally lies within the nature and harmonizes with it.

Timber structures became popular as it had some distinctive characters, which helped to make a comfortable environment not only within the building but also in its surroundings in the comparatively hot climatic regions in the tropics. Timber as a material was not only used for the movement of air within a structure, but also as a cavity wall, which helps the structure to be insulated against, heat which is an essential need in tropical buildings. (Figure – 4)

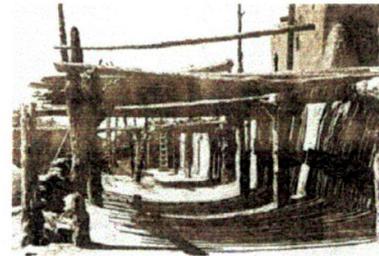


Figure 4 – Timber as an eco friendly material from the history

Earth construction is highly considered especially in the hot dry climate, as the primary consideration in these areas of high temperature is the intense radiation. Structures with mud and wattle walls and thatched roofs is traditional as it contain aspects of eco systems and generates a high thermal capacity to keep the environment cool while giving a pleasing appearance. (Figure – 5)

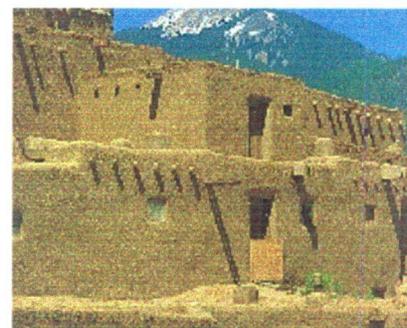


Figure 5 – Small openings located in solid walls reduce the heat penetration into the buildings

- **Architectural forms**

As Martin Evans observed,

“The traditional built forms often represented the result of many years or even centuries of optimization in relation to the resources of material & labor, the activities carried out within and around the building, the social organization of the household and the climate⁵.”

(Figure – 6)

Traditional forms built in the tropics, too highlighted the different attitudes towards each climatic aspect and enhanced the architecture in various different ways. Simple light timber structures with elevated roof forms, more open walls were the predominant built forms which existed in the past not only because the under development of



Figure 6 – Diyabubula - inspired with traditional architecture

technology, but also as they encouraged more to gain cooling systems through natural air circulation, natural lighting by allowing more openings in the walls to the natural environments, growth of vegetation and many other fundamental issues to make it a “Comfortable place” within the nature.

- **Concept of Court yards**

The courtyard concept existed during the vernacular period, as a solution to gain the best out from the natural environment. The courtyard in the tropics has been the most significant



Figure 7 – Keeps the insides cool of the built structure and penetrate light naturally

element since it existed, as it was an ideal solution to gain natural lighting and ventilation in a more strategic manner,

which comprises of the fundamental issues of eco friendly architecture. *(Figure – 7)*

⁵ Evans, Martin – Housing climate and comfort – p1-3

1.2.2 _____

Eco friendly adaptations in contemporary tropical architecture

Contemporary tropical architecture faces a distinctive challenge to accommodate an urbanize humanity as it has changed the face of the earth and the conditions of humanity. With the changing world the human needs have changed radically. Further, the nature's belongings too have changed considerably. This has resulted in radical changes in the contemporary tropical architecture and its friendly approach to the nature. To balance the rapidly changing human needs with environmental opportunities and liabilities is the challenge that lies ahead of the designers.

To help create receptiveness for the emergence of the above-mentioned new kind of architecture, various design adaptations and strategies have been implemented to combine the climatic responsiveness with functional efficiency and the pleasing appearance.

Heat is the main liability in the tropics when considering climatic responsiveness. The undesirable heat is mainly due to direct sunlight and (figure - 8) its reflection; encouraged by conduction, convection and radiation, which helps to penetrate the heat in to the building. In a situation when heat is predominantly too hot especially as in the desert climates for comfort and avert negative aspects to be eco friendly, in the contemporary practice; architects uses strategies like minimizing solid enclosure and thermal mass, orient broad building surfaces away from the hot day western sun, elongate or segment floor plans to minimize internal heat gain and maximize exposure for ventilation, minimize openings oriented toward sun

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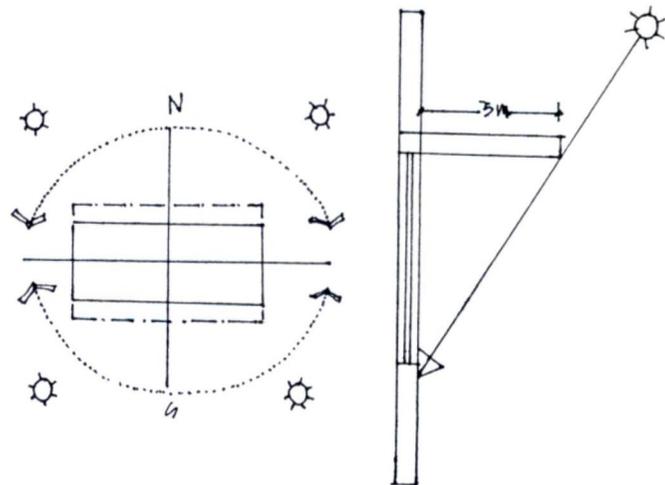


Figure 8 – Horizontal devices to stop direct sun onto the north facing walls

exposure, separate rooms and functions which covers breezeways to maximize wall shading and induce ventilation, use light colored walls and roof materials to reflect solar radiation, isolate heat generating functions like kitchens and laundries, submerge reflection by using grass and various other vegetation.

(figure – 9)

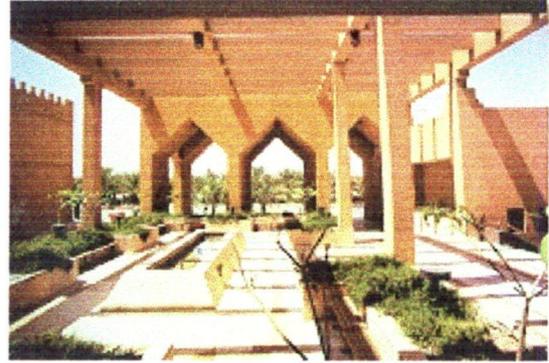


Figure 9 – the shading devices make the spaces both visually and physically comfortable

Glare is another fundamental problem, which has to be looked in to in a climate like a warm humid tropical climate. It is a significant liability in these hot climates as it reflects radiation of the sun, which transfer not only heat but also unsatisfactory visual distortion. The contemporary practice adopts various methods like using light colored wall and roof materials with rough surfaces, shading devises such as louvers and trellises with natural vines to block sun without blocking out breezes and natural light, using overhangs to shade walls and to cut down direct sunlight. (Figure – 10)



Figure 10 – elongated over hangs cut the glare penetration into a building

High rainfalls in most of tropical upland climatic regions causes excessive moisture and humidity which makes possible physical damages to the building, strategies to reduce the discomfort of high humidity include maximizing ventilation, moving moisture producing functions such as kitchens and



Figure 11 - Building on a water body to withstand the rain

shower room to outside areas, having deep verandahs, canopies to protect from rain, placing openings in a proper way to protect the building from moisture which directly hit with rain. (Figure – 11)

Wind is an asset to hot climates like composite monsoon climates in the tropics; mainly because it strips the heat away. In the present context it is very important to use natural ventilation to give comfort in both indoors and out doors. This helps to limit air conditioning and conserve energy to a great extent, which makes a building more eco friendly towards the nature. . Wind scoops, wind turbines and thermal chimneys are frequently used to gain natural ventilation in various buildings in the tropics; especially in the tourist field and in housing. (Figure- 12)



Figure 12 – the building responding to the heavy breeze



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1.2.3 _____

Enhanced eco friendly architecture in tropical eco systems

The eco systems, which exist on earth, are very sensitive. Damage can be done easily. But is very much interdependent on biological relationships and is easy to become eco friendly as it consist some essential components of eco friendly aspects.

Tropical eco systems enhance the most exclusive natural environment ever found in the world. The identical tropical climate and rich soil types have generated species of flora, fauna and wild lives, which make unique natural eco systems in the tropical environment. The natural eco systems with this inherited scenic beauty have made people become more and more interested in traveling to these eco systems unique to the tropical climate for leisure and to gain a sensible exposure to the nature. Thus has

generated physically built forms mainly to experience this exclusive environment, which is highly sensitive and vulnerable. The differences in species of flora and fauna due to differentiated climatic conditions have resulted in the existence of physically built structures to suit its environment and enhance the architecture in a significant way with a least impact to the nature. Thus resulting in different eco friendly attitudes generated towards the tropical eco systems ranging from tropical forest, savannah to dessert eco systems.

Tropical forest

Tropical forests are the most fascinated eco systems, which includes streams, river and various flora and fauna. These, the lush tropical flora, wildlife and streams amidst the forest generate exquisite beauty of nature unique to the tropical climate. *(Figure – 13)* Here the architectural attitude is to highlight and give significance to enhance the natural beauty but not the architectural product. The forms, materials, colour and the texture of the product is most simply built and merely follows the rhythm and the pattern of the nature, while nature based activities is highly enhanced to experience the physical feeling, spatial progression without any damage to the nature.

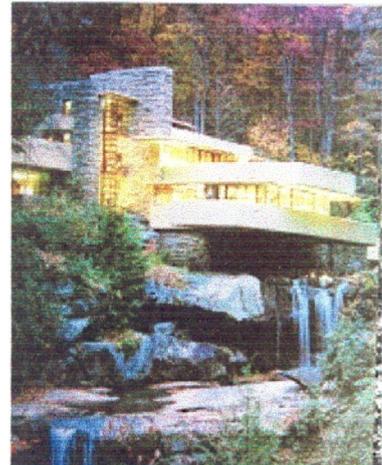


Figure 13 – falling water by Frank Lloyd Wright - recessed amidst the lush forest

Specialized eco systems with the tropical forest and along the sea

Mountains, swamps, marshes, forest mangroves and coastal lagoons are the important natural eco systems found within this area. Physical integration of sea and the forest has generated a special character of these eco systems and is enhanced by the natural vegetation and the eco logical aspects. *(Figure 14)*



Figure 14 – Pangkor Laut resort, Malaysia

The architecture also has generated significant characteristics enhanced by these eco systems and the most prominent is the lightness of the structures on to the marshy soil conditions without exploiting it especially as it houses an exclusive ecological activity of migration of birds. Thus the architecture as it has made sensible eco friendly approaches to carefully protect the liveliness of the existing nature.

Tropical savannah and desert eco systems

The tropical savannah and dessert eco systems are the most undesirable eco systems found in tropical eco systems. Though the eco systems are harsher they have generated special characteristics where the vegetation coupled with hot desert climate have generated an exclusive environment. (Figure – 15)

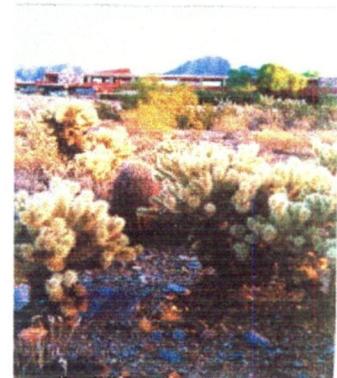


Figure 15 –
Teliesin west

Architecture with environments as such reflects the sense of these environments and enhances not only its form and the materials but also the elements used to protect from these hot dry windy climates.

1.3 _____

Application of “green principles” on eco friendly architecture in tropical climates

Man, of course, learned early how to modify and subsidize nature for his direct benefit, and he has become increasingly skillful in not only raising productivity, but more especially in channeling that productivity into various other things which includes architectural productivity as well.

“Whilst a new maturity begins to emerge in safeguarding the environment, it is not as yet widely reflected in architectural expression. “ green” is a nebulous, much abused term, having the magical property of investing ecological value on anything without discrimination. ⁶

⁶ Former, J – AD journal vol 67 – P 18

Many buildings have some attributes, which may be described as green. But in practice green buildings varies widely. It can range from being energy efficient and using non-toxic interior finishes to being constructed of recycled materials and completely powered by the sun.

With the application of “green principals” in the tropical climate it offers an opportunity to create environmentally sound and resource buildings by using an integrated approach to a design. These buildings promote resource conservation, including energy efficiency, renewable energy and water conservation features, consider environmental impacts and waste minimization, creates healthy and comfortable environments, reduce operations and maintenance cost and address issues such as historical preservation. To achieve these, “six green principles” have been proposed by Brenda and Robert Vale in “green architecture” which helps to create a physically and physiologically comfortable environment.⁷

1.3.1

Conserving energy



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Energy is an important common denominator in all eco systems, whether designed by nature or by man. In the years that followed, green architecture was characterized as energy conscious design. As catastrophe had somehow been averted, energy is now a precious and more to the point, expensive commodity. This has given the architects and planners a great responsibility to create receptiveness for the emergence of a new kind of architecture that combines climatic responsiveness with functional efficiency and a pleasing appearance.

(Figure – 16)

Figure 16 – Facilitating maximum natural light and ventilation



⁷ Vale, Brenda & Robert – Green architecture

The fundamental issue of an eco friendly building is to help conserve energy optimally and to keep the inside of a building comfortable at the right temperature and the perfect quality of air. This can be easily gained in the tropical climate, as its comparatively enriched with free energy from the nature with clear sky conditions, moderate temperature and wind patterns which are mostly constant throughout the year. Thus the critical requirement is to create a good design, which has incorporated deep thinking of various fundamental issues in both eco friendly architecture and eco systems. The use of natural light and ventilation is essential, as it helps conserve energy to a great distinct in the tropics.

Thermal mass is another important concept to keep in mind when dealing with tropical environments. It is important for eco friendly buildings in the tropics to be built with materials that have a large amount of thermal mass. Materials, which has a large thermal mass like mud brick and stone are ideal because it absorbs much of the energy they receive from the sun and helps the building to be much cooler.

1.3.2



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Working with climate

*“Mankind’s physical flexibility and capacity for adaptation is relatively feeble compared to those of many animals, who pose for defenses against a large range of unfavorable climates”.*⁸ (Figure – 17)



Figure 17 –
Respecting the tropical sun

To balance these human needs with environmental opportunities and liabilities, it is essential to keep a close relationship with the climate. This relationship of a building, with the environment needs to be considered from the initial design stage itself.

⁸ Brennan, J – The Architecture of Ecology (AD journal) – p23



By definition, “ a green building” design seeks harmony with its environment, which mainly includes the climatic conditions as well. In the tropics, while natural sources such as the sun, wind and water help create a comfortable environment; glare, moisture dust etc. acts as a barrier to it. The compromise of both these positive and negative environmental aspects is the challenge, which lies ahead to all environmental designers especially when considering and working with the climate to produce a facility design, and activities, which encourage close interaction with the natural environment. This gives the client a feeling of being somewhere special and imports a “sense of place”.

1.3.3 _____

Minimizing the new resources

“Reduce, reuse and recycle are three important tenets for a building to be eco friendly while being sustainable.”⁹

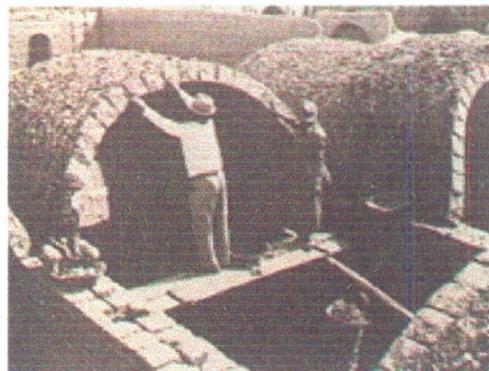


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- John Farmer

Regarding minimal environmental impact, it is important to use the main strategies; building with appropriate materials, reuse & recycling of materials, use of the right material for the right use and waste management. Thus envisage the rehabilitation and the upgrading of a structure. (Figure – 18)

Figure 18 – building with local materials from their own surrounding



⁹ Farmer, J – The Architecture of Ecology (AD journal) – p20

1.3.4 _____

Respect for user

The beauty of an eco friendly product is about nature including the human species. It is about building with nature, not over powering it and building with the advice and involvement of local people. It is the user whom is the fundamental issue when regarding the functional aspects of a building. Thus “Green” architecture recognizes the interest and importance of all the people involved from the design and construction process to the ultimate user. Therefore “ a human built form” should be the main objective of any architect or planner irrespective of deep thinking of the project.

Thus the building especially to be eco friendly needs respect to all categories of people involved in it in physical, psychological and emotional aspects. Therefore the vital aspect is to consider these aspects from the initial design stage with deep thinking regarding various aspects like, function & user comfort, which relates greatly to the sustainability of the built products and also the user.

(Figure – 19)

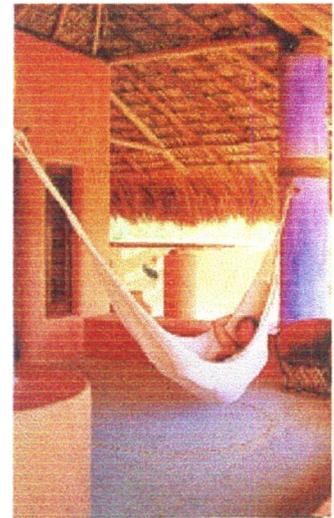


Figure 19 – User comfort in the tropical environment

1.3.5 _____

Respect for site

The earth is the shelter, moderator of climatic extremes, the resource of minerals, sands, clays and rock, the medium for vegetation and other forms of organic life, the work place & playground of man. A built product categorized as an eco friendly building, on any site for any purpose should be able to be removed from its site and leave it in the condition as it was before the building was placed there, highlighting the critical aspect of “touch this earth lightly”. Simply, it is the retaining the sustainability of the nature

and its eco systems. Thus the success of an eco friendly architecture often hinges on the initial process of site selection.

As Jorge Wilhelm says, a built product

*“Has to deem worthwhile- that is eco friendly – it should always consider its physical setting in relation to its site, and in an intelligent way”.*¹⁰ (Figure – 20)

Application of methodologies such as orientating the building according to the sun path & wind patterns, to specific site conditions & to its vegetation and the using of materials from that area can be used to achieve this aspect. This results in positive strategies, which can work well in the tropical climate and enhance the built product with physical, psychological and visual comforts.

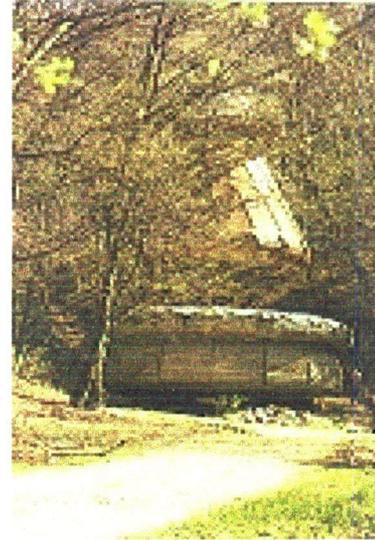


Figure 20 – architecture merged with the environment

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1.3.6 _____

Holism

Making environmentally sound building by choosing sustainable ways of putting them together involves more than having ideas, but holistic attitudes towards the balance within nature is needed as no one building demonstrate a monotonous approach, but allow a variety of aesthetic opportunities that can accommodate stylistic taste. Thus however develops an architectural language on its own giving meaning and purpose to forms and systems used.

¹⁰ Day, Christopher – AD Journal, Profile No 106 – p22

1.4 _____

Psychological perceptions of eco friendly architecture elaborated in the Tropics

It is commonly known that eco friendly architecture and its design strategies are not simply physical interpretations created using elements and images, but contain deep psychological perceptions, which generates a strong emotional sensitivity in human mind. Philosophical expressions highly elaborated in eco friendly architecture, enhanced spirituality of the place and the context, enlighten imagability and emotional experiences of the spatial progression, enliven architectural expressions are the visual generators of the emotional perceptions that enable to capture the real spirituality of eco friendly architecture born in a particular place and is the ultimate sensitivity generated in the place.

1.4.1 _____

Imagability and the Spirituality of the place



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As Lynch describes;

“Imagability means the shape or colour arrangement which facilitate the making of vividly identified, powerfully structured, highly useful mental images of environment”.

Though the variation of the extent of the sense, perception and cognition from person to person is inevitable, the excellent imageability of physical environment, which facilitates the human sensation and perception in eco friendly architecture as a whole can be categorized as the respect for the user as well as to the particular site and its environment.

One should not forget that it is the environmental imagability, which protects man against getting lost. Such special structures are connected with character and meaning. But poor imagability generates a greater tendency to cause emotional insecurity and fear. Thus it is important for the “emotional” and “value” aspects of the image to be the major

contributors for the perceptual organization of the place.

It is further evident that an enhanced imagability is the fundamental issue for the spirituality of a place. *(Figure – 21)*

The spirit of a place is the quality that blooms up context, man's conception and expressions they wants to be and determines the essence or the character of the place. Thus the critical point in architecture during the place making process signifies the involvement of place. It is at this point which consideration of the spirit of the place needs deep thinking and capturing, as positive spiritually progressive spaces gives inner power to occupants and offers a comfortable environment, which undoubtedly generate the strong character of the place.



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Figure 21 – power images created on a strong coloured and textured background

1.4.2 _____

Emotional sense of spatial progression enhanced with architectural elements

The psychological impression and the experience of an eco friendly architectural product start not at the door of the eco lodge, but at the point of an entry into an area. But it is the architectural product, which ultimately enhances the emotional sense of a user.

An architectural product can be considered as an assemble of series of spaces. These spaces while serving the purpose needs offering of not only visual satisfaction but also a positive environmental experience that a person encounters when moving through the spaces. Thus a totally satisfactory experience generates a sesnse of the place and conveys a message of a meaningful environmental design as equally as the natural environmental qualities of space.

To achieve the above purpose eco tourist architecture organizes a particular pattern with the specific images and indicates a starting point and a terminating point with the progression of movement manipulated in an environmentally friendly way. In helping this series of progressions towards the climax helps create significant and deliberate manipulation of spaces with different qualities at different stages (*figure 22*)

These architectural environments can be specified as creations by elements, which enhance the quality of physical environment, and creates eco friendly relief, and are of two categories. The physical entities; scale, mass & volume as generators or definers of the space and modifiers as colour, texture, lighting enhances of the spatial qualities or environmental qualities.

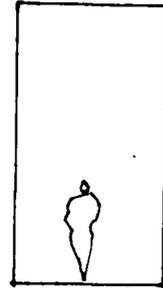


Figure 22 – The Relationship between Scale and Human figure





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Chapter Two

Eco Friendly Architecture in Tropical Eco Tourism

2.1 _____

Concept of Eco tourism and Eco tourist Architecture

The term eco tourism was coined by Hector Ceballos Lascurain in 1983, and was initially used to describe nature based travel to relatively undisturbed areas with an emphasize on education¹¹. Eco tourism in its concept interprets as traveling towards the nature while been sensitive towards its belongings and the local, cultural environments.

However, the concept now, has developed to a scientifically based approach in both sustainable tourist products and activities. Today the tourism industry, which carries a green label, is moving towards designing for sustainability, which is a powerful form for environmental preservation & protection and responsible eco tourism includes programs that minimize the adverse effects of traditional tourism on the natural environment, and enhance the cultural integrity of local people. Therefore, in addition to evaluating environmental and cultural factors, initiating recycling, energy efficiency, water re use, the creation of economic opportunities for local communities have become integral parts of positive eco tourism.

Thus, all what emphasizes successful eco tourism is nothing, but a friendly built environment created within a natural environment facilitating to explore the nature both physically and visually. As a result the built environment in eco tourism or the eco tourist architecture from its evolution has become the fundamental element as it satisfies not only the natural, cultural & social aspects, but also the economical aspects within the natural setting. (Figure - 23)



Figure 23- eco tourism elaborated as a friendly built environment created within the nature

¹¹ Joseph, Jacintha – Article on Eco tourism: Meeting the challenges of the third millennium

2.1.1 _____

History and the evolution of Eco -Tourist architecture

The term eco tourist architecture, undoubtedly is the generating architecture for eco tourism which facilitates the protection and enhancement of natural built and cultural features while giving a valuable set of climatic and eco logic experiences to the visitor.

In the early 50's mass tourism to natural areas by people was a common phenomenon and became increasingly popular. Thus realized the damage cause by mass tourism was very much significant and moved to generate a kind of tourism, which was identified as eco tourism, which highlighted a sensitive and cautious approach towards the ecology of nature.

With the evolution of the concept of eco tourism, most of the tourist destinations, which operated the conventional tourism envisaged to promote their natural settings and beauty in to eco tourist destinations. University of Moratuwa, Sri Lanka
www.lib.mrt.ac.lk Queensland coast in Australia, Hawaiian Islands, Fiji & Western Somalia were the first tourist destinations, which promoted as eco tourist destinations. Consequently eco tourist destinations, though originally existed from these areas with enhanced natural habitats, were inspired with the exclusive natural eco systems in the tropical environment and the indigenous culture which is mostly embodied with these natural settings, which makes the tropical regions as the most fascinated eco tourist destinations in the world.

These people who traveled to experience the nature were significantly different from that of mass tourist and required a place not only to rest and observe but also to fulfill their basic facilities such as food, login, toilets etc. Thus a need for a physically built space came into existence.

(Figure 24)



Figure 24 – eco lodge evolved in 1950's facilitates just the basic facilities

The concept of eco tourism as the sensible tourism towards the nature too, implied on to the physically built structures and appeared fulfilling the basic requirements in a sensitive manner. This was mainly emphasized by using simple materials, which gave a positive impact to the site while satisfying the needs of the travelers. But in its evolution, while the architecture was becoming more sophisticated enhancing the real sense of eco tourism, the simply built structures in eco tourism too are making eco tourist architecture to become the major element in eco tourism. (Figure – 25)



*Figure 25 - Eco tourist architecture celebrates the spirituality of nature
-Sonrise Eco Lodge at Queensland*

2.1.2 _____

Metaphors and Eco lodges in Eco-Tourist architecture



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Eco tourist like all other market segments seeks enjoyment and memories from their travels and their activities are concerned unique to its natural environments to the particular area. Thus from the very beginning eco tourist architecture was considered as an art form, where the designer arranged all indigenous cultural and natural assets in to a guest experience.

The concept of eco tourism; though it is sensitive nature traveling, in different physical and functional aspects three distinctive formations or metaphors can be found. The architecture generated in these metaphors also has this distinctiveness where one can identify easily. Thus the most distinctive metaphors in eco tourism can also be described as most exclusive architectural metaphors, namely; nature & adventure parks, villages and eco resorts.

The lodge is the basic built environment found in all these eco tourist metaphors that provides sensitive lodging facilities within the natural setting. The architectural significance of the lodge is its different architectural formations found in each eco

tourist metaphor, but more importantly mainly with the common design and functional aspects.

Eco tourist nature and adventure Park

Eco tourist nature and adventure parks are the most elaborated in eco tourism as it offers the people to gain exciting experiences of the nature, this is mainly done by facilitating and creating journeys and excursions through the nature which gives not only a physical psychological experience but also an exploration of the nature. (Figure – 26)



Figure 26 – architecture to capture the essence of nature; black rock lodge at Belize

The simple eco tourist built spaces or architectural products in these nature parks are located informally in the most fascinated spaces to rest and observe the nature while

the eco lodges built in eco adventure parks mostly on adventurous spaces like tree tops, mountain tops facilitates with deep physical experiences making a strong sense towards the nature's belongings.

Eco tourist villages

Eco tourist villages have become the most fascinated product in contemporary eco tourism. These are mainly incorporated in to existing traditional villages located in natural settings. (Figure 27) The architecture of eco tourist villages mainly gives the sense of a village atmosphere from the built form, patterns and the layout, while inherent socio cultural activities and the events in the villages

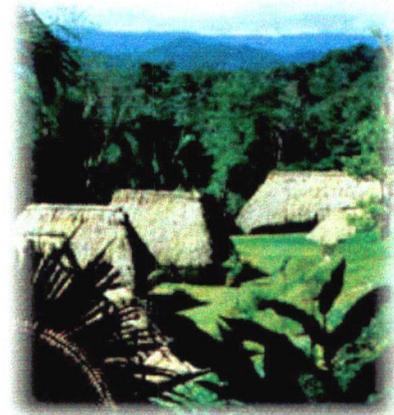


Figure 27 – An eco village at Pookes hill; Belize

elaborate the spirituality of the place to a greater depth. The tourist in these villages are greatly fascinated to experience the natural setting and makes them to part of the villagers by experiencing the socio cultural activities in the village; thus resulting in benefiting the local people which generates the typical eco tourist concept.

Eco tourist Resort

Eco tourist resorts can be categorized as a physically built space or a space in a comparatively different small natural setting. In the contemporary practice this is the most famous metaphor in eco tourism as it has a closer attitude towards the conventional tourism in terms of soft and easy accessibility but totally away from the conceptuality. (Figure – 28)

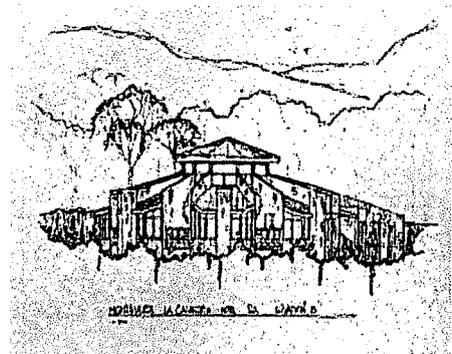


Figure 28 – Eco Resort

The concept of eco tourist resorts always caters to the visitor with simple basic facilities while enhancing and improving their sensitivity towards the nature. The architecture in this category needs deep thinking as it generates a comparatively large physically built environment. The characteristic feature is that the highly physically built environments contain more friendliness towards the nature and facilitates nature based events and has greater tendency in becoming nature friendly as eco tourist adventure parks and eco tourist villages.

2.2 _____

Enhanced Eco-tourist architecture in the tropical environment

The climatic aspects in the tropics has given rise to number of diverse eco systems which is unique such as rainforests, man groves, sand dunes & coral reefs and presented significant aesthetic values, resources, economic landscapes and complex natural systems. Apart from that the indigenous cultural aspects generated within the natural settings too have become exclusive elaborations in the tropical climates.

These natural and cultural landscape features have defined the intrinsic character of the tropical environment and have become the main attractions for the eco tourism as it facilitates with a range of activities such as trekking, bird watching, hiking and water sports which can be experienced within the nature. The architecture too is elaborated and is influenced of this natural and cultural landscape. Thus facilitates the eco tourist who seeks responsible traveling to natural areas to divert to the tropical environments to celebrate their needs and make a feeling of “being somewhere different” in these exclusive tropical climatic conditions.

2.2.1 _____

Inspiration of tropical architecture

The key to success of positive eco tourism is an environment with outstanding beauty and one should not forget that the experience in eco tourism starts not only at the door of the physically built product but at the point of entry to the area. Thus it is obvious that the eco tourist seeks close involvement with authentic natural and cultural experiences throughout the visit.

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It is here that the relationship of tropical architecture arises with eco tourism as the architecture generated in the tropical environment has exclusive characteristics expressed with strong architectural forms and elements. These physical expressions, which can experience both physically and visually, are created as the adaptations for the prevailing climatic conditions and also as celebrations of exclusive images generated by the tropical climates. Thus has resulted in exclusive physical expressions created by highly elaborated eco tourist architecture, which has enhanced the tropical character of the natural setting. (Figure – 29)



Figure 29 - Enlightened nature on tropical architecture

2.2.2 _____

Distinctive elaboration of architecture in the eco tourist metaphors in tropical climates

The tropical climatic conditions have enlightened with diverse number of eco systems and the enlivened cultural aspects has given rise to number of eco tourist activities and facilitates to create a variety of eco tourist architectural products in a more distinctive manner within the eco tourist metaphor, which is also an enhancement of eco tourist architecture in the tropical climates.

Comparatively, nature and adventure parks are the most highly boosted metaphor in the tropical climate; mainly because of the existence of variety of distinctive architectural products, built in unique exclusive natural settings ever found in eco tourist architecture.

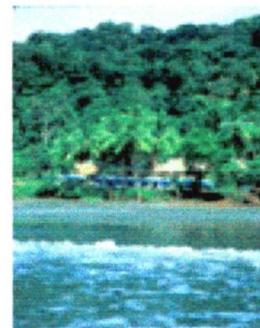
The eco tourist villages, elaborates a totally negative conceptual arrangement within its location; generally which is an unequal physical and geographical setting. This village architecture is merged with inherited socio cultural aspects generated within the exclusive tropical environment and has made both visually and functionally different architectural products. (Figure 30)



*Eco Village
at Clarissa falls*



Amazon Nature Park



*Eco resort at
Belize, USA*

Figure 30

The eco resorts though it lies within a close proximity, the variety of tropical eco systems generated around the metaphor itself facilitates to respond and enhance the vibrant environment with different architectural interpretations and makes a strong elaboration of eco friendly architecture in the tropical climates.

2.3 _____

Interpretations of eco friendly architecture in the design principles of tropical eco-tourist architecture

The eco tourist architecture generated in the tropical climate is mainly elaborated on three design principles; the generation of sense of place, use of sustainable design methods, and the application of the concept of the carrying capacity. The analysis of these principles reveal as the deep interpretations of the physical and psychological perceptions of eco friendly architecture elaborated in the tropical climate.

The generation of sense of place is obviously the enhanced spirituality of a place, the emotional sensitivity, generated by the psychological perceptions which is created with imaginability and the spatial progression enhanced with architectural elements in the concept of eco friendly architecture.

The principles of use of sustainable design methods and the application of the concept of carrying capacity (limitation both to the built products as well as the visitors) is totally an interpretation of a holistic approach of green principles to a greater depth in two different ways. Working with climate, conserving energy, minimizing the new resources can be categorized as the elaborated aspects of sustainable design approaches where as respect to the user and respect to the site are the ultimate objectives of the concept of carrying capacity.



2.3.1 _____

Generation of sense of place

Human civilization is an integral part of the natural world and is dependent on the preservation of nature for its own perception. Over the ages, the complex interaction of natural evolution and human adaptation has given every place on earth a unique set of qualities that sets it apart from all other places.

The “sense” of a place is the emotional sensitivity generated in a person’s mind created by a strong image or images in a place. This created emotional or psychological sensitivity of the mind will make the user to become familiar to that place. When the sense is weak, the user becomes lost and unsecured. Thus the extent of sense generated at a place is very important to determine the likeliness or dislike ness and also the cognition of the person over the place.

In the concept of eco tourism as its ultimate objective is to make spiritual sense of nature traveling, the images created within the nature are very important as they generate strong visual perceptions. These images are the images of nature enhanced with sensitively built physical images, which gives a strong image or character to the entire setting.

These sensitively built physical images can be considered as the physical expression of eco friendly architecture where as the images created within the site will make emotional sensitivity in spatial progression and this strong image or the character is the imagability; the psychological perceptions of eco friendly architecture.

The characteristic feature of the tropical environment is that the exclusive natural and cultural images created within the natural setting facilitates to create elaborated built images which makes strong spatial enhancements and imagabilities which results in creating a strong sense of place that can be ever experienced in eco tourism.

2.3.1.1 _____

Imagability

Before all is said and done it is important to pause and look for the qualities, which often escape the ordered dimensions of the site. Thus if one truly wants to attend to the heart and spirit of the land, it is crucial to sensitize the imagability of that special place. (Figure 31)



Figure 31 – powerful colour arrangement enhanced by the light reflected on traditional architecture

This imagability can be defined as the strong image or the character generated or created by highly elaborated physical image or images; the psychological expression or perception in the concept of eco friendly architecture. Thus the creation of imagability has become an important issue in the concept of eco tourism as it gives a strong character to that exclusive setting or the eco tourist metaphor, which is inherent to the place or the context.



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The tropical environment has a distinctive advantage and the imagability can be generated easily as it contains highly elaborated distinctive natural and cultural images inherited within its natural settings.

2.3.1.2 _____

Emotional sensitivity of spatial progression enhanced with architectural elements

It is very much evident that the identification of local attitudes and concerns about tourism development, coupled with environmental sensitiveness can help shape unique images in architectural products, especially in the tropics with its blessed natural resources.

Thus in the concept of eco tourism the main objective as to experience the spirituality of nature while traveling is mainly done by facilitating to get visual experience of exclusive spaces with the images created within the nature. These images are merely the sensible spaces arranged in a more sophisticated manner elaborated with architectural elements; scale, volume, Colour & texture which generates emotional sensitivity in their spatial progression within the setting as well as which creates a strong sensitivity of the place

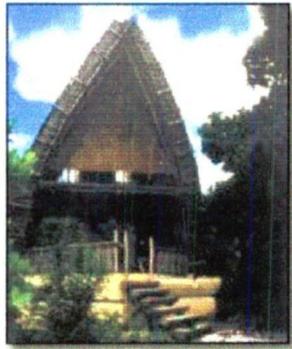


Figure 32 – Hut front lodge;
 Propotianately high scale
 visualize the sense of verticality of
 the forest

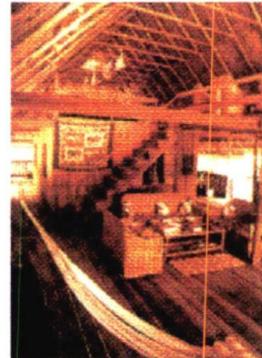


Figure 33 – volume
 enlightened with colour
 and texture

2.3.2 _____

Use of sustainable design methods

The goal of sustainability is to create optimum relationships between people and their environments. More specifically, sustainable design should have the absolute minimal impact on local, regional and global environments to enhance the sanctity of a place, its people and spirit.

Thus it is the architectural built products, as the physical built components created within natural settings must be designed in a sustainable manner to achieve the totality of the concept of eco tourism.

The analysis of the principle of using sustainable design methods reveals that the principle is the strong interpretations of some of the green principles; conserving

energy, working with climate and the minimizing of the use of new resources; the important sustainable design approach which is highly elaborated in the tropical climates.

2.3.2.1 _____

Conserving energy

The characteristic feature of eco tourist architecture is to make the traveler feel the integrity and diversity of biological systems and their functions. Thus encourages to use living systems, rather than artificial systems that require maintenance and unlimited energy sources; a vital aspect of a sustainable design in eco tourist architecture.



Figure 34 – maximum use of natural light and ventilation not simply to conserve the energy, but also to feel the spirituality of the nature

(Figure – 34)

Energy conserving eco tourist architecture can mitigate the energy use for structures for heating or cooling, locate wind breaks to divert cold winds in this exclusive tropical climate, create wind tunnels to channel cooling breezes and provide shade in hot climates and the adopted day light strategies for lights, which will help the tourist to facilitate with the exclusive natural environment in the tropics and to move away of using high technology and conserve energy to a greater extent.

2.3.2.2 _____

Working with climate



Figure 35 – the amazon eco resort in resonance to the hostile climate in the tropics

It is commonly known that the tropical environment contains the most exclusive climatic conditions on earth. Thus has resulted in vivid inspiration on eco tourism. *(Figure – 35)* These existing climates of the tropics contain a variety of attributes that can be capitalized on to

the architectural product. Patterns of breezes, sun and shade, cool, wet and dry areas may all be found on the site and can be used in siting buildings and out door areas for human use to maximize comfort without artificial heating or cooling.

Hence, orientation to sun and breeze, and relationship to natural sources of water are significant considerations, which can be easily adopted in the tropics in siting of eco tourist architectural products to offer the maximum comfort within the structure.

2.3.2.3. _____

Minimizing new resources

To gain the maximum result of sustainability in the tropical eco tourist architecture the ideal situation in minimizing new resources which are non renewable is to use and construct with natural, sustainable and recyclable materials collected on site, (figure 36) generate its own energy from renewable sources such as solar or wind, minimize the need for construction. Apart from that the use of ground water recharge and preventing of runoff, use living systems rather than artificial systems, use existing vegetation and manage its own waste organically. (Figure – 37 & 38) Thus these aspects help avoid disruption to the sensitive eco systems on site.



Figure 36 – materials found from its own environment at Black rock lodge



Figure 37 – composite toilets and the solar heated shower At Trek-stop village, USA

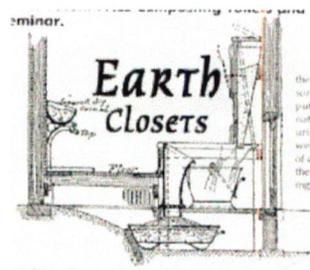


Figure 38 – details of a composite toilet

2.3.3 _____

Application of the concept of carrying capacity

It is needless to stress that the carrying capacity is the key elements in eco tourism. The concept of carrying capacity is highly elaborated in the eco tourist architecture as it explains the need of an eco tourist setting which requires limited or assigned number of built spaces as well as limited number of visitors at a time. Thus emphasizes that the concept is to keep a more relaxed, calm, and sustainable environment while making the visitor to experience the nature more spiritually.

In the analysis of the concept it mainly emphasize that the architecture is the ultimate respondent in elaborating the concept of carrying capacity as the limitation of the built products will automatically limit and control the number of visitors that can occupy at a time.

The eco lodges in Beizil an extent of 20 acres are in small scale with around 24 guest capacity.



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This restriction has been imposed so that the visitor impact ratio is not unbearable which will result in non-degradation of the environment, as the degradation of the carrying capacity of the environment in any circumstance, directly affects the site and the user and losses the respect to both these; thus highlighting the concept of carrying capacity as strong interpretation of the green principles of respect for both the user and the site.

2.3.3.1 _____

Respect for site

A friendly relaxed and flexible environment is prompted by virtually, all eco friendly architectural products. In seeking the highest value of this aspect, prevention of negative

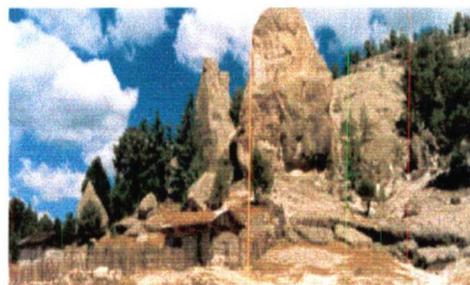


Figure 39 – the eco lodge totally merged within the setting

impacts by using the principles of respect for site explains the in depth idea as “touch the building on earth lightly” (*figure – 38*) which means “make least impact upon the earth without physically or visually distorting the originality of the place.

In consideration to site designs for eco tourist facilities, it is evident that site designs are consistent in their defenses to existing site conditions both in the tropics and elsewhere. Therefore when there is a conflict between a site and building element and the site it self, naturally the man made element is distorted or changed to meet the demands made on it by the site. Thus highlights the in depth respect made by the designers, planners and all others involved in the design.

In the tropics, as both natural and man made eco systems are very sensitive and can be easily damaged, sensitive placement of built structures within existing landforms is essential for the sustainability of the site. Thus has rise the need of limiting number of built products in the eco tourist setting which his regulated in the concept of carrying capacity; the critical strategy that adopted to minimize the pressure on the site, the strongest interpretation of the concept of respect to the site.

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2.3.3.2 _____

Respect for user

A well-planned and well-executed community relationship is as important as a well planned friendly, relaxed and flexible built form for the long-term success of any eco tourist facility. It is very much evident that the sustainability of any built product mainly depends on the user who seeks close involvement with the nature both physically and visually. (*Figure – 40*)

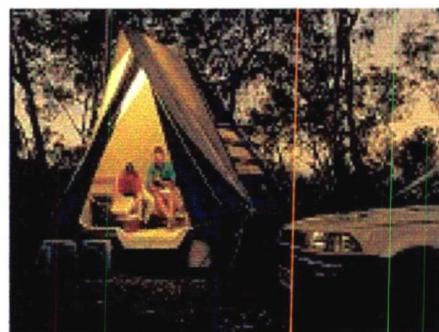
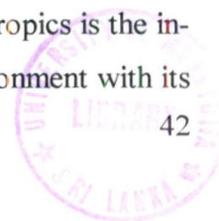


Figure 40 – facilitates to get the spirituality without disturbing the nature

Thus one of the most significant issues of the tourist architecture in the tropics is the in-depth understanding of what is to be offered to the user as tropical environment with its



exclusive climatic conditions offers unlimited attractions from palm fringed beaches, mist laden highlands to ancient historical and cultural sites. This is more comprehensively elaborated in the concept of carrying capacity as it limits the number of built spaces which gives rise to limit the number of users and thus to make the user to gain the real sense and the spirituality of the place.



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Chapter Three

Generating Eco Friendly Architecture for Eco Tourism in Sri Lanka

On the scale of a world map, Sri Lanka previously known as Ceylon appears to hang like a tiny teardrop over the Indian Ocean. In reality though, this tropical isle is certainly no drop in the ocean but spreads 270 miles from North to South and 140 miles in width, giving a land area of 25300 Sq. miles.

The intrinsic character of the climatic conditions of this tropical country is it's radical climatic changes which prevail within the country and which can be experienced in a short period of time during a journey. These climatic conditions change from tropical beach level with a temperature of mid 29 C to 10 C in the breathtaking hill country. The important aspect is that as quickly as the climate changes, so does the change occurs in



Figure 41- Nature and its eco systems

the distinctive climatic zones which comprise dramatic sceneries such as palm fringed beaches, wild life, exotic flora, plains and highlands, rivers, lakes and waterfalls; the result of diverse eco systems of the country. (Figure 41)

Further, the history and the culture in Sri Lanka which began when Buddhism gave birth to a cultural revolution more than 2000 years ago is also merged in these exotic natural settings; one by the existence of number of historical and cultural sites including world heritage sites, and the other by the culture which was elaborated by the rituals of various traditional life styles and has given rise to spiritual life to the nature. (Figure -42)



Figure 42 – history recessed in nature

These cultural aspects exist so distinctively that over the centuries they have learnt to respect their cultural differences and is justly proud of their past. The cultural background is such that every visitor to the country is

welcomed with a smile and gracious gesture of greeting and an “ayubowan” the wish for a long happy life and reflects the island’s age-old custom of hospitality, its traditional way of life and culture, which always inspired the spirituality of nature.

Sri Lanka as a country blessed with these distinctive natural eco systems and inherited culture, which is embraced with nature, facilitates a greater potential to generate sensitive eco tourism in practice, mainly because the concept of eco tourism is highly celebrated in the tropical nature and the culture. Three architectural tourist products, in Sri Lanka; Ulpotha village - Kurunegala, Ella adventure park at Ella-wellawaya and the Nature Resort at Dambulla which evolves in the natural settings with a closer relationship with the eco tourist metaphors has highlighted the impotency of a comprehensive architectural review to further strengthen and elaborate the possibility of generating eco tourism in the country to a greater depth. Thus the study has involved these three products to discuss the eco friendly architectural attitudes both negative and positive to make a comprehensive understanding the reasons of their existence in the natural settings, thus to visualize the proper way of generating sustainable architecture for a sensible eco tourism in Sri Lanka.



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3.1.1 Introduction

Today buildings have different functions; inside and outside ones. Inside is to house an idea, outside they bound, articulate, focus or alter an external space, adding to or detracting from what is already there; the spirit of the place. The Ella Adventure Park situated within a thick-forested valley overlooking the Kirindioya, along the Ella Wellawaya road in the hill country of Sri Lanka is thus the finest example of this nature of built structures.

The lush forest extended to a large natural setting enriched with exclusive natural eco systems which has given greater potential for exclusive eco tourist activities such as trekking, swimming, nature and animal watching as well as the sensitive architectural products created within the natural setting has thus enliven the park to be more adventurous and emotional to a greater extent.

3.1.2 Evaluation of the principles of Eco Tourist Architecture in The perceptions of Eco friendly Architecture



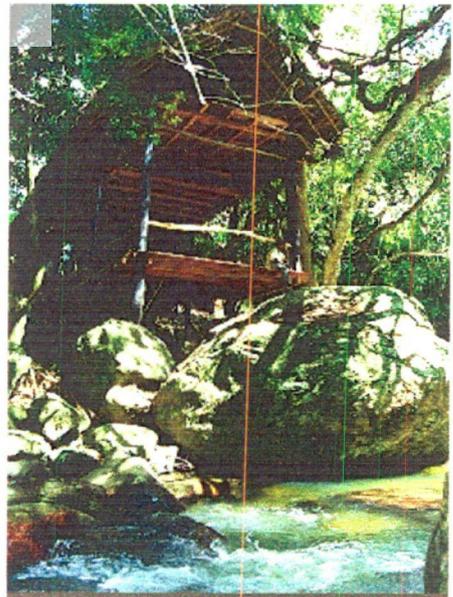
3.1.2.1 Generation of sense of place

Many of the finer qualities of a space; the complexity of meeting forms and planes, the metamorphosis of one shape, form space into another, the effects of natural light can only be approximately and inadequately anticipated. They must be made. Not doing so will result in buildings threaten and destroy or add to and create places, to nurture the sense of place, which in turn nurtures us.

Architecturally, what we can do to help nurture to generate the sense of place externally is to understand the built structure as what is was and what it will be with afresh-new ideas. Internally what it has to offer. Thus will enhance the generation of the sense in the place automatically.



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Ella Adventure Park

Ella Wellawaya

The architecture at Ella Adventure Park has typically followed these aspects giving prominence and facilitating the visitor two extremes of sense of place; the quality of the forest atmosphere and the merged built products.

Here the architect has mainly tried to offer the visitor to experience the built structures visually and physically and make them feel that the natural environment has enliven to a greater extent by the use of these built products in the adventure park. Thus highlighting the architecture as the strongest generator of the sense of the park.

3.1.2.1a Imagability

The main intension of the built products in the park is to support and enliven the potential of rich eco tourist activities, which can take place in the natural setting. The architecturally built spaces mainly using timber not only as structural components such as roofs, walls, columns and doors and windows, but also as elements such as furniture, fences and ladders has compose as various identical architectural forms and blended with each setting. Thus has resulted in creating a strong imagability of a forest. Further the built structures located at different settings totally enhancing the adventurous and spatial qualities of the natural setting within the architectural language; facilitates imagability to a greater depth. (Figure – 43)



Figure 43 – vibrant colours of the nature reflected in to the structure

3.1.2.1.b Emotional sense of spatial progression enhanced with architectural elements

Traditionally built spaces recessed within the nature have simply demarcated the enhancement of the park but preserving the face of the forest in a sophisticated manner. (Figure-44) The



Figure 44 – the park recessed in the forest facade

comparatively highly raised gable roof visible within the nature has created a friendlier welcoming in to the park. Along the structure is the path which leads into a space located few steps above the floor. The relatively raised roof in that space makes a smooth continuation of the path as it has maintained the same height and volume along the path. The half raised mud wall, which continues along the path, which is about three feet high, coloured in deep red emphasize this special continuation more visually. Thus it is at the end of



Figure 45 - built structure submerged into the forest

this point one could visualize as the meeting point of the path, which leads to the entrance and the forest. Thus is harmonized with a fine timber structure; one which appears as if merged in the nature while harmonizing and enhancing the verticality (figure – 45) of the surrounding. The fascinating feature here is the inclusion of existing trees within the timber structure which steps down in different levels towards the forest making the visitor feel the real sense of a mountain and its adventurous aspects both visually and physically.

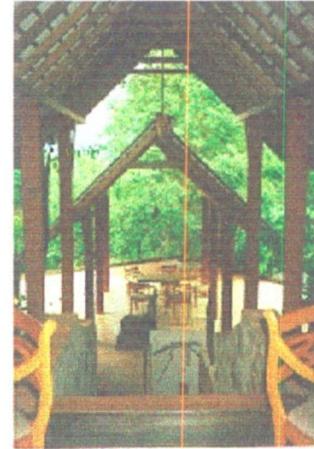
The continuation of the path leads to the restaurant created volume by the architect with high gable roofs, which has enhanced the spatial quality within the structure. This gable roofed, less elaborated structure entirely constructed with using timber has been slightly



Figure 46 – restaurant opening to the nature

distorted by the rigidity of the furniture and thus has resulted in allowing the visitor to gain the maximum spirituality of the space created to enjoy.

Next is thus the tunnel located at a lower built space from the restaurant highlighting the gradual disappearance of the forest highlighted not only by the overlooked roofs but also the stepped down tunnel which gives a sensational progression within it. *(Figure 47)* This sensational progression is highly elaborated as the tunnel is created to suddenly experience an open area, which is the jungle.



*Figure 47 –
maintaining the
volume*

After having moving through an enclosed space, the sudden openness to the natural surrounding offers the visitor to experience the frequently changing vistas, and nature events. The narrow paths which merge within the forest has gradually opened into some built spaces, which are located at different settings, totally merge the structure within the nature. The sensible access provided with timber bridges and hard paved paths enhance the sense of adventure to be anticipated. All these built spaces designed with timber decks at different levels accommodating different activities open to the forest making enchanting views of the mountain range over looking the forest canopies. *(figure 48)*

The breath taking view of the changing patterns of the colour changes of the night sky, the whispers of the wild animals and vistas made with the gradual rising of the sun enliven by the sound of birds facilitate visitor to capture unexplained spirituality of the nature.

The architecture of the cabanas; the vertical extrovert ness created with an enhanced scale elaborating on highly raised steep gable roofs with the simple colour and textural patterns within the space has contributed



*Figure 48 – view over the forest
canopy*

to gain the spirituality more sensitively. Further, the timber deck at the intermediate levels, which act as the visual breakers of the verticality and the spaces with deep climbing, enhance the character and the adventurous sense of the forest to a greater extent.

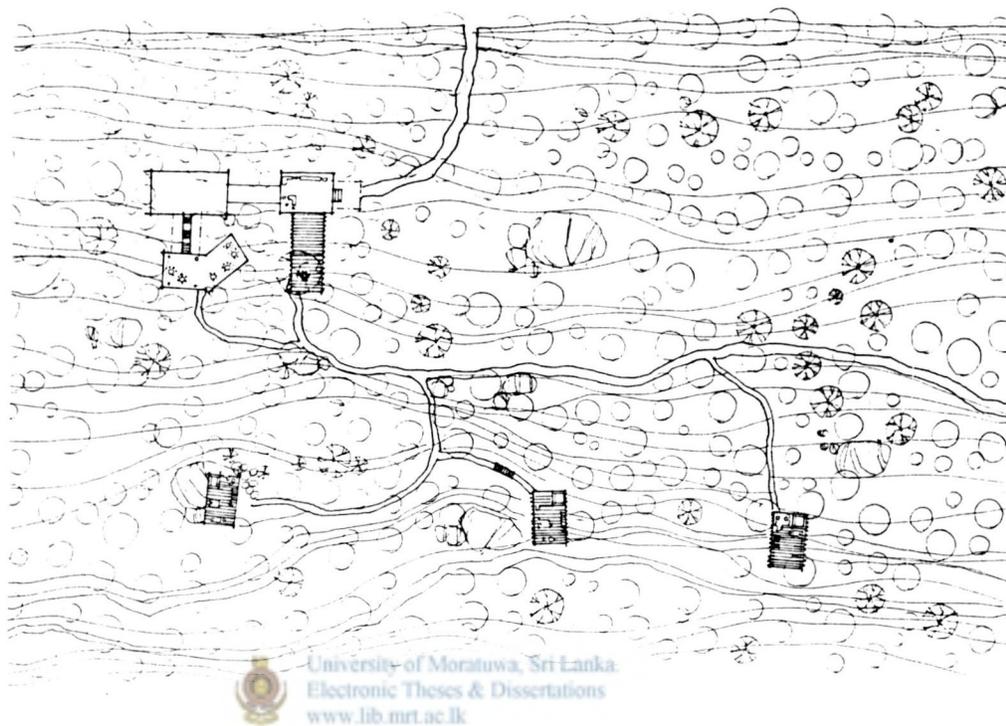


Figure 49 – Layout of the upper level of the park

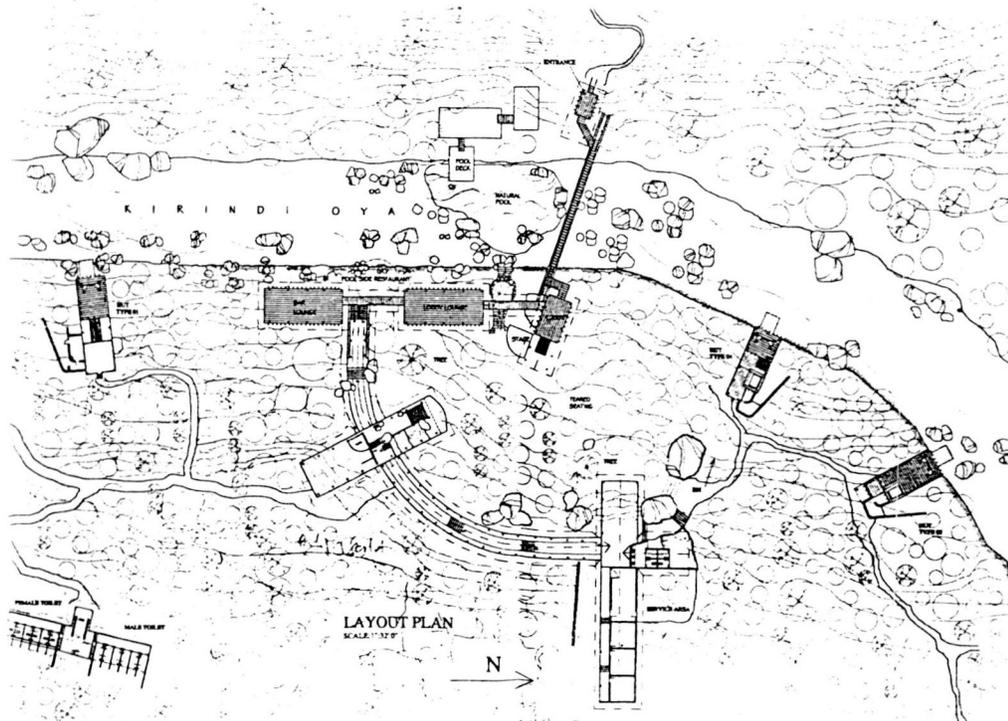


Figure 50- layout of the lower level of the park

The vicinity of the suspended timber bridge which lies as if exist from the natural environment enhance, visualize and offer the spirituality as if entering into an open area. Thus the visitor who becomes sub merged in to the setting by the vibrant colors of the nature reflected by sun light along with the cool breezes of the river enhances the ultimate spirituality of the nature. (figure 51)

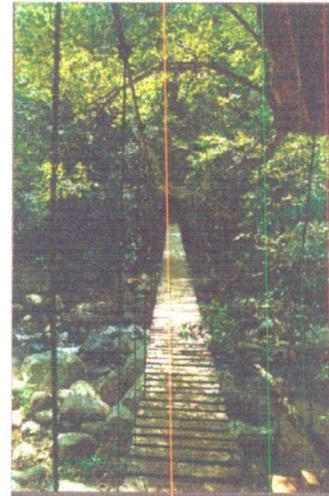


Figure 51 – merged into the forest

The architecture which interpret with more extrovertly built timber structures in this exposed settings over looking the Kirindi oya; the projected timber decks harmonized in scale, half built walls, entirely open gable ends has further enliven this spirituality thus absorbing these excitements of nature.



(figure 52)

Figure 52 – Destination of the journey

3.1.2.2 Using of sustainable design methods

Architecture, which appears as simple elements used in the landscape of this huge natural setting, has always attempted to enhance the nature to the maximum. Thus the design aspects from its initial stage mostly generated and came into existence in a most simple manner to achieve the sustainability within the nature.

3.1.2.2a Conserving energy

The park as it is located on the upland rain forests, a comparatively a cool and misty environment during most of the year can be experienced. Thus adequate daylight and keeping a warm environment within the built spaces naturally is the strongest issue. (figure 53) To facilitate this major aspect, most of the built spaces



Figure 53

have been entirely opened and are orientated along the east

west axis. Thus has achieved to gain maximum natural day lighting in to the structures and keep the interior warm as well. But here the controversial issue of using metal sheets as a roof covering material for some roofs, though it satisfies to maintain the heat within the building, has distorted the visual appearance of the natural forest. But the use of traditional lamps and candles for light and heat generating during the night totally avoiding the use of energy consuming electricity is a distinctive character of this park facilitating to the sustainability to the built products and enhancing the visual and psychological perceptions of the visitors.

3.1.2.2b Working with climate

Tropical upland mountain climate, a low temperature climate with around 24 C emphasizes comparatively high moisture and humidity, which is generated by excessive rain frequently experienced in the area. The architecture with highly emphasized gable roofs covered with long projected eaves and only opening at gable ends which face mainly to the east and the west has elaborated the strong response to the climatic conditions, which prevails in the area. (figure 54)



Figure 54- respect to the tropical climate

The structure always built on above ground on top of the trees or on raised timber columns in stone footings have also visualized the steps taken to protect the structure from moisture and dampness and the biological aspects, which exist due to the climatic conditions. Apart from these the intrinsic character of the built products in the park is the breath taking vistas, which has been created while over coming the problems of unpredictable climatic aspect. Thus has given rise to greater enhancements of visual comfort and psychological as well as physical comforts.

3.1.2.2c Minimizing of new resources

Material is the fundamental issue, which needs to be considered to achieve the aspect of minimizing the number of new resources. Here the architect as used timber as the main material along with other materials like clay, cadjan, kabook stones found from the area it self has been used to minimize the use of new resources for its sustainability.

The argument arises on the timber found within the site. The correct use of them rather than miss using was the most appropriate way which has helped not only to minimize the use of new resources but also becoming sensible to ecology as it is a material which decay with time more easily. The considerable use of artificial materials in construction such as metal sheet roofing and glass has slightly moved the sustainability of the principle, but significantly preserved the sustainability of the construction as a whole. (figure 55)



Figure 55 – materials from its surrounding

The reduced gravity of the composite toilets which are located at the most elevated levels has been done to avoid penetration of waste in to the river avoiding the use of any artificial methods to dispose the waste. But the criticism that has arise over the design strategy of the toilets is still questionable as the function does not serve the purpose fully during the rainy season due to the heavy and frequent rains which can be experienced in this upcountry rain forests.

3.1.2.2 Application of the concept of carrying capacity

The adventure park with its least number of physical built spaces have made the architecture become less prominence, which has resulted in enhancement of the forest both spiritually and physically. The limited number of built spaces created at the destination point within the adventure park has automatically controlled the number of visitors; thus elaborating how strong the architecture can emphasize the simple definition of carrying capacity of a product, which is the main facilitation to the respect for the site as well as the user.

3.1.2.3.a Respect for site

In the architects point of view, even the limited number of built spaces created within the natural forest was not a deep thinking of a design concept, but naturally created by following the exclusive characters inherited in each setting in the forest. (figure - 56)

Thus the design, which exists in the park, has mainly followed the rhythm of the nature enhancing the greater respect given to the site.



Figure 56 – recessed within the forest

Along with these simply built spaces the sensibly designed paths within the nature has also made the visitor to become more sensible and friendly while experiencing the spirituality of the surrounding.

3.1.2.3b Respect for user

The limited built spaces, which have simply elaborated at the entrance and at the destination facilitate the visitors to get the spirituality of the forest. Further the architecture of these built spaces alone has attempted to give the encompassed spiritual and adventurous sensitivity of the surrounding with by using its own architectural language to further elaborate the sensitivity into a greater depth; the strong respect made towards the user both physically and emotionally.



Figure 57 – experiencing the nature

The long journey from the star point to the destination point, though facilitates numerous vistas and images both man made and natural, the journey through the path has been felt as somewhat beyond the limit and has rise to the visitor's interest decrease.



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Ulpotha

Ulpotha Village, Kurunegala

3.2.1 Introduction

Ulpotha (perennial spring) is an ancient tank fed village in the hinterland of the great civilization of Anuradhapura. The village is laid hidden in the foothills of a magnificent forested mountain range overlooking high paddy fields and a sacred reservoir (wewa or devine reservoir). This delightful setting as per historical traces believe as the playground of prince Saliya and beautiful Asokamala, highlighting the long relationship with the great civilization of Anuradhapura.

Ulpotha is by no means the fine example of a traditional village amongst organic paddy and hena cultivation, infused with the spirit of travelling, medicants, siddhas and princesses of a bygone era; the “Puranagama life style”. Thus facilitates to experience the rituals and cultural traditions of wanni (indigenous) agricultural society and allows a chance to shed imprints imposed on them by modern society and instead indulge in the harmonious co existence of nature and man; the most spiritual experience generated in the concept of eco tourism.

This self sustaining village being in an area where intuitive, timeless knowledge seems somehow steeped in the land itself, is a place in which traditional life style comes easily and naturally. Perhaps more than anything else at Ulpotha, it is this uncanny sense of peace and tranquility and one’s mindless awareness of it, which is its most striking feature. Ulpotha has thus been transformed into a self-sustaining, bio diverse organic farm it is today; one where the practice of farming is holistic and includes paying respect to the land and its resources, as well as to the deities protecting it. Though this magnificent village functions through out the year, the tourist is allowed only during the Maha season; the season of paddy cultivation, which starts with filling the sacred reservoir by the monsoon rains, to the point where the harvest is taken to prepare the first Bata (milk rice) to offer to the village temple in the sinhala new year.

Along with these auspicious activities related to the traditional paddy cultivation; the traditional rituals and events like dance, bali tovil, medicina, cuisine, meditations (yoga) which has also become part of the traditional life style and performs respecting to nature, facilitates the visitor to get a deep physical and spiritual sense of the living pattern of the tropical traditional sinhalese village co existed in nature.

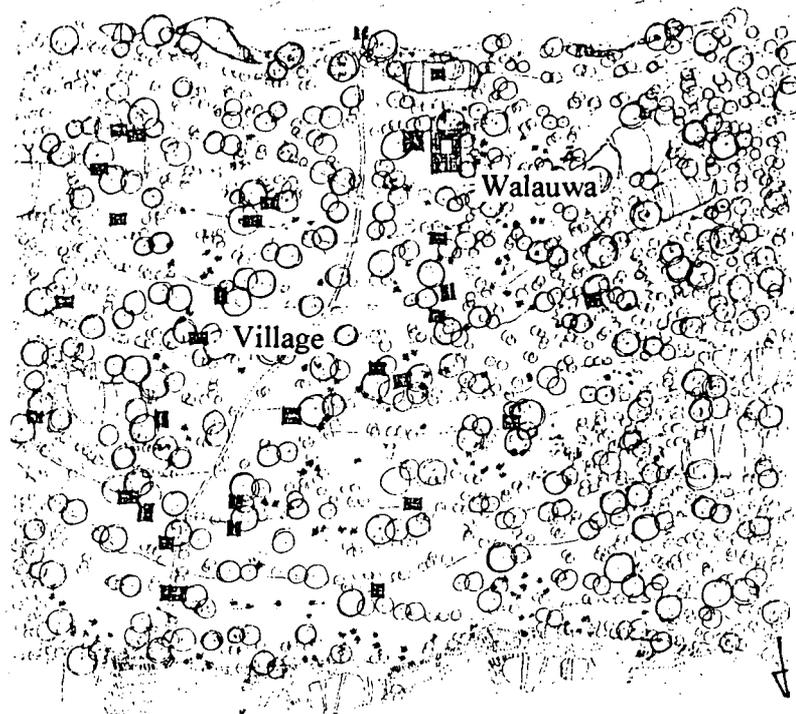


Figure 58 – village layout

Paddy fields

3.2.2 Evaluation of the principles of Eco Tourist Architecture in The perceptions of Eco friendly Architecture

3.2.2.1 Generation of sense of place

Though many words have been spoken and written about the need to preserve our environment and to live in harmony with nature in order to add quality to our modern life styles, all too often these words are rarely translated into concrete deeds. Ideals are sacrificed to the demands of the practical. But as for this village it is about the experience of a relaxed and contented life style. Its practice is based on the appreciation and need for leisure and pleasure, whether in work or play, and the need for adequate rest if a life is to be well lived. The traditional life styles here provides room for all the ingredients required for a balance existence; a personal and immediate relationship to family, community, nature and the spiritual world, an attitude to work as a life style rather than a labour, a valued place for play as well as ample time to rest.

At Ulpotha the characteristic feature is that these traditional activities has been merged perfectly in harmony as eco tourist activities which now takes place in different natural

settings within the nature. To achieve this the lands are still organically cultivated, trees were planted, traditional wattle and daub houses were built and was brought gently back to magical life. Here the architecture has created different physical elements and continued with the built identical to each setting inspired by each various different activities. Thus the architecture has become the ultimate generator of the sense of place, as it enhances each space in its physical expression that can capture the spirituality of the place in greater depth.

3.2.2.1a Imagability

What is now referred to, as Ulpotha is the ancestral land belonging to regional chieftain. Ulpotha's foundations are thus laid on the timeless grounds of nature, history, tradition and myth. The surrounding limits continue to harbour cave dwelling ascetics and practicing shamans and the land remains infused with the still potent therapeutic spirits of the gods, kings, priests and romance of its storied past. Thus has resulted in having its layout according to the sacredness of each and every element.

The original layout of the village is arranged as a traditional tank fed village, where the village is located below the wewa over looking the paddy fields. The temple is on the top most level creating and giving the visitor the imagability of the village as of one, which has a strong spirituality and devotions, within the setting. Thus the imagability which distinguish this type of eco tourist product starts at the point of entry it self and continue in such away that it alone creates the imagability of the place. (Figure 59)



Figure 59 – spirit of the village

The houses are arranged in the hierarchical order respecting to their social status; the walauwa at the top elaborating a rich architecture with a majestic structure with white washed walls and tiled roof; the peasants houses below in simple wattle and daub structures; the traditional “wee bissa” or paddy stores in the center of the village

surrounding to elaborate the richness and the sovereignty of the village enhances the imaginability and individuality to a greater extent.

But some structures added into this traditional village set up such as the gateway constructed in traditional form, highly elaborated timber structures and the spaces elaborated with the vibrant colours mainly in the walauwa, the yoga kuti with its peculiar architecture have distorted the spirituality of the imaginability of the traditional village setup to a considerable extent.

3.2.2.1b Emotional sense of spatial progression enhanced with architectural elements

The narrow path which leads to the village arranged with well-grown trees forming different textures of shades around with the penetrated trees and branches makes the visitor to gain the spirituality of the nature even before entering to the village. This path

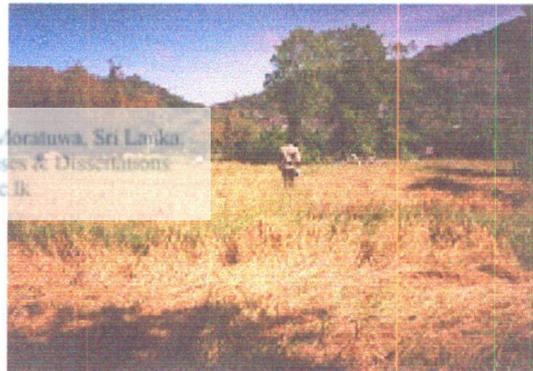


Figure 60 = sudden appearance of the village at distance

which suddenly opens into a paddy field where the village is feebly visible at a distance, emotionally changes the visitor's mind creating the sense of an approach towards a traditional village, not only simply by the bright view of the paddy field created by the sunlight, but also the activities which take place on the field. (Figure -60)

The path which continues through the field leading to the “kamatha” (*figure 61*) located at the edge which connects into a wider path, the shades created with the natural vegetation which is dispersed in both side of the path has generated a strong physical and psychological relief after making a hard travel through the paddy field in the hot sun. The kadulla at this point is visible at a distance making the sense of the entrance to a traditional village. This kadulla though it is a simple physical barrier made with two timber poles across three stone pillars makes a strong emotional barrier to the visitor. But the traditional structure located behind the kaduulla; the structure (*figure –62*) created with a void between two solid entities has made a sense of gateway. Though it is proportionately friendly with the surrounding, has given an alien outlook highlighting it as an after thought.



Figure 61 – experiencing the traditional cultivation



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Figure 62 – kaddulla at the entrance

It is at this point thus which one is able to capture the typical atmosphere of a traditional village, which is merged with the nature by the visuality of the path, which gradually leads to the village. This is further elaborated by the architecture within the built structures as they are arranged in accordance with typical traditional architecture evolved, which was always infused with the nature. (*Figure 63*) In this architecture the most



Figure 63 – traditional structures infused with nature

enhanced aspect are the open verandahs as it makes not only simply a physical comfort but also a strong psychological comfort mainly by the visual enclosure plane highlighted on deeply coloured and textured elements like doors windows and the mats laid on the floor. But it is necessary to highlight as some of these elements has been over elaborated and has created a visual distortion within the mind.

Apart from these the gradual progression which has facilitated the visitor the totality of the sense of a traditional village the walauwa, weebissa, ayurvedic centre, meditation areas, has thus given rise to absorb the spirituality of the infused culture and architecture of the village into a greater depth. *(Figure 64)*

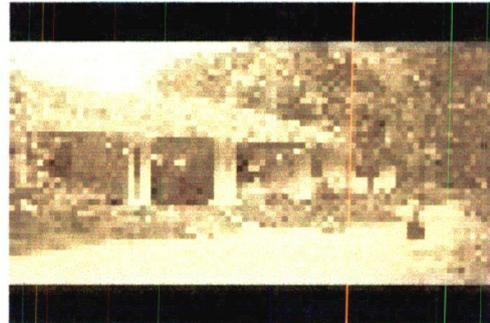


Figure 64 – the walauwa stands amidst the village

But the recent architecture applied by using colour in to the walauwa to enlighten the spaces has lost the sensitivity of simplicity into a considerable extent generated within this traditional architecture.

Thus highlighting the spatial progression vertically, the devale is built at a higher level along the path which leads to the reservoir, the architecture has merged the structure into the nature giving the spirituality of the invisible god who enliven the forest. Further, the culmination of the path into the wewa facilitated with

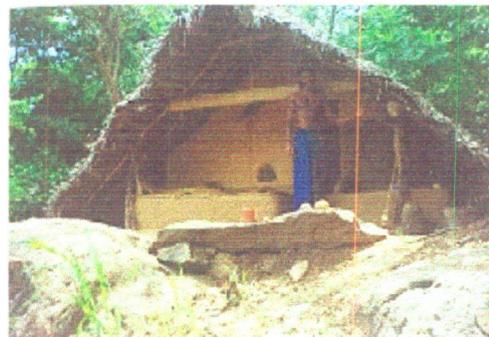


Figure 65 – devale totally merged into the setting

exclusive vistas of nature and the vicinity of the temple visualize how strongly culture is embraced into the nature. *(figure 65)*

3.2.2.2 Using of sustainable design methods

A built product having a more power of decaying with least environmental forces within a short period of time leaving no traces or any physical or visual distortions in the nature is the ultimate objective behind the using of sustainable design methods in the concept of eco tourism. Thus considering the village as its totally designed and built using traditional architecture and design methods, the sustainability has been achieved to a greater extent within its eco friendly architectural interpretations.

3.2.2.2a Conserving energy

The village as its located in the dry zone, heat was one main issue to be considered greatly in generating comfortable cool physical environment within the structures. But here the architect's role to deeply consider the aspect of conserving energy is minimal. This is mainly, due to the sustainable village setup created with the use of the wewa or the reservoir by the ancestors who had sensitive eco friendly perceptions. This architecture thus is viable in today's context as well, as the village surrounding still successfully capture the wind patterns and enhance a comfortable cool environment, allowing to totally avoiding artificial methods to keep the environment comfortable. This aspect has been made easier as the present architect has followed the rhythm of *this sustainable architecture more sensitively.*

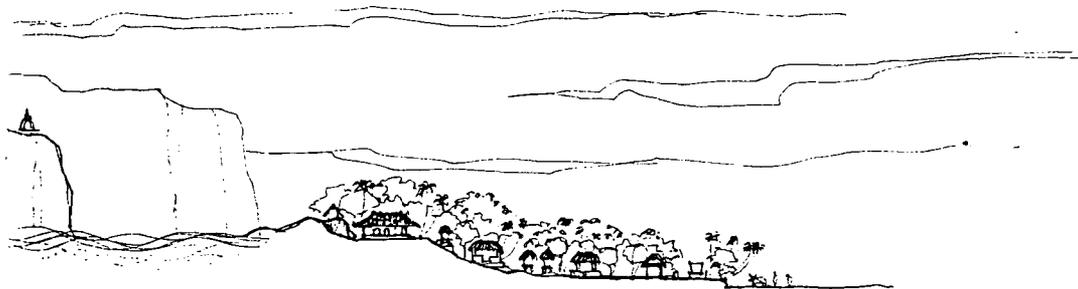


Figure 65 – typical section of the village

Further elaborating this traditional architecture, the built structures constructed with natural resources found in its own environment, facilitating with more open verandahs, and air gaps the use of natural lighting systems in the night has significantly contributed in conserving energy.

3.2.2.2.b Working with climate

The most characteristic feature in this hot dry climate is glare, radiation, dust and the seasonal rains. These strong climatic forces are highly inspired in the adaptations of the design strategies in this traditional village. The orientation of most of the structures been



Figure 66 – highly protected for the forces of the tropical climate

made to face the northeast & northwest, thatched roofs with long eaves, thick mud walls with least openings at the gable ends are some of the strategies adopted to avoid direct tropical sunlight penetrating into the structures.

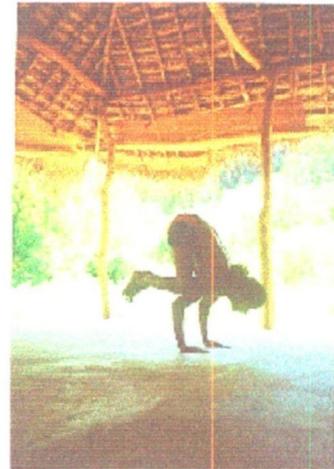
The use of raised floors, application of cow dung is methods, which has been used to avoid biological attacks (*figure 66*), which is significant in during the seasonal rains in the dry forest eco systems.

3.2.2.2.c Minimizing new resources

The traditional construction materials and methods have encouraged not simply only to minimize the new resources but to totally avoid the use of new resources. Thus the architecture generated in the village has greatly contributed to avoid any possible damage, which can cause disturbance to the ecological balance of the precious dry forest eco systems. (*Figure 67*)

In the village recycle and reuse of resources such as decomposed used cadjan and the hay used for organic cultivation, recycle and reuse of water for cultivation has discouraged the use of new resources in every aspect.

Figure 67 – entirely depended on the existing materials



3.2.2.3 Application of the concept of carrying capacity

Here too the number of eco lodges located within the vast extent of acres of land implicates how strongly the concept of carrying capacity is expressed as this limited number of eco lodges have precisely controlled number of travelers being visited at the seasonal period of the year. Thus the Architecture has become the strongest body in visualizing the concept of the carrying capacity in this eco tourist village, which has sensitively respected both to the site and the user.

3.2.2.3a Respect for site

The village with its less built spaces within the forest has always enhanced the character of nature without over powering it. Further elaborating, these physically built spaces, which are located at different physical settings within the same natural forest on trees, rocks, and along water stretches enhance the aspect of how the architect has followed the rhythm of the nature identically by merging it with the natural setting.



(Figure 68)

Figure 68 – simply standing on the nature

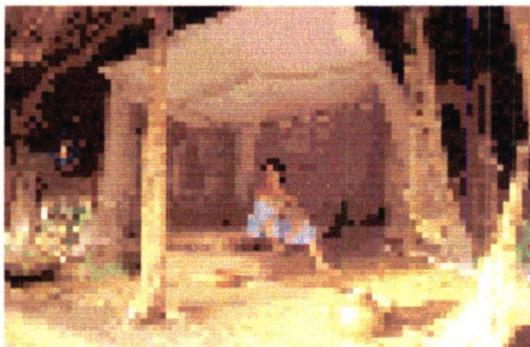
Here at Ulpotha except for some built forms which are added in an unconscious manner most of it has been done in a sensible manner without making any physical or visual distortion to the nature and thus not over powering it. This aspect has been easily achieved mainly because the architecture used is infused in the traditional architecture of the country.

Thus the whole architecture generated within the village has more sensitivity and positive aspects of an eco friendly built product. Thus can be categorized as a built product, which has been successful in the attempt of minimizing the damages totally to facilitate the real sense of the surroundings and the typical tank fed village atmosphere.

3.2.2.3b Respect for user

The village at Ulpotha, which is located in a natural setting, is enriched with the traditional cultures, which exist in Sri Lanka. To gain the real spirituality of the culture and the environment merely cannot be experienced by visiting for a limited period, but needs to experience by been a hostile and a part of the village activities. Thus the built spaces have significantly become the major issue to make the visitor feel the said village atmosphere as it is now. *(Figure – 69)*

The development of villages, today in Sri Lanka has given rise to the degradation of the typical village atmosphere. But at Ulpotha, the limited number of built structures clustered among the natural setting fed and enriched with the natural eco systems is successfully managing to maintain the real sense of the typical tank fed village and offering the visitor the rare opportunity of experiencing the village atmosphere to a

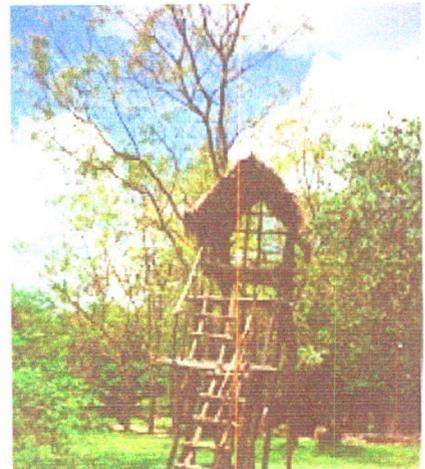


greater extent. But the structures at some times draped with fabric and the tourist to be facilitated with loin clothes to become a peasant are still questionable as whether the sensitivity is given truly.

*Figure 69- highly elaborated spaces
loosing the spirituality*



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Nature Resort

Dambulla

3.3.1 Introduction

In today's context, a common phenomenon in the tourist industry that has come in to existence with the rapid growth of eco tourist products is the various technological revolutions which has produced unprecedented levels of global resource exploitation and environmental degradation, happening at an increasing level and in an intolerable scale leading to large scale depletion of natural resources and environmental pollution. But here in Sri Lanka the nature resort at Dambulla, the resort with around ten successful "lodges" was an implementation to these environmental ills and degradation.

This resort situated in the natural dry forest is in the vicinity to the Kandalama village over looking the breathtaking Kandalama reservoir. The resort comprises of lodges built according to traditional architectural forms highlighting the main cultural practices in Sri Lanka which has always promoted the essence of simple ways of life. Here the simplicity and clarity prevails in the whole range of activities starting from food and clothing, habits, religious and cultural practices and further to the planning and design of the tourist built product and its environment. The characteristic feature of this eco friendly product is that here at this resort all this is encompassed into an open area of about twelve acres by the thick dry forest enriched with a number of rare dry forest eco systems which has facilitate to strongly enhance the eco tourist character of the resort. Thus a minimum area of forest cover has been used to allow for the human settlements and the production of food, disturbance to the ecology has been maintained to the bare minimum, use of high technology is completely ignored and is entirely harmonized with the surrounding beauty.

3.3.2 Evaluation of the principles of Eco Tourist Architecture in the perceptions of Eco friendly Architecture

3.3.2.1 Generation of sense of place

From the past the settlements of the people in the dry zone was in close proximity to the source of water for the purpose of direct human consumption, cultivation and the raising of animals. The lodges are located in an order, which gives a social cohesiveness and a sense of security and protection from the wild animals in the surrounding jungle. These architectural built spaces, simply concentrated within the open spaces facilitate the visitor to gain the real sense of a traditional village atmosphere and the natural eco systems. But the distinctive character which has generated the sense of place at this resort is that its successful ability to offer the tourist the same village atmosphere by constructing simple traditional built structures entirely new, distinguishing it self from Ulpotha which has facilitated the visitor with a village atmosphere by merging simple built structures in to an existing village. Thus has generated a sense of place on its own to a greater depth in a more harmonizing manner.



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3.3.2.1a Imagability

One of the most important issues of the architecture for eco tourism is an understanding of what is to be sold. Thus the need of the imagability of the architectural product plays a vital role. The sense of a traditional built spaces (*figure –70*) arranged in a more traditional manner within the forest over looking the reservoir has given a strong imagability to the resort as a typical village pattern of Kandyan peasant houses which existed in the past.



Figure 70 – sense of traditional village

This imaginability has become more elaborated not only by the traditional architecture but also the cultivation and various other activities, which is merged in with the tourist activities within the natural forest and the village. Here the guest would really get down to basics and experience life as it was and is, in the villages of Sri Lanka, which is healthy, unpolluted, simple life style and judging by the immediate interest it has generated, one that is much in demand.

3.3.2.1b Emotional sense of special progression enhanced with architectural elements

the path, which gradually leads through the harshly grown dry forest and extensively grown bushes make the real sense of, the dry zone both visually and physically. Thus within this the sounds of birds and inhabitants like squirrels too has enliven the spirituality of the place more deeper. The deep walks, makes the visitor feel the gradual change of nature created in nature, and makes the guest to experience it; thus giving both visual and physical relaxation. **(Figure –71)**



Figure 71- sensible access created through the forest

The sudden exposure of built spaces in an open area after the long walk through the path psychologically gives the feeling of more comfort ability. Thus is more enhanced

by the restaurant built with simple materials found in the immediate surrounding.

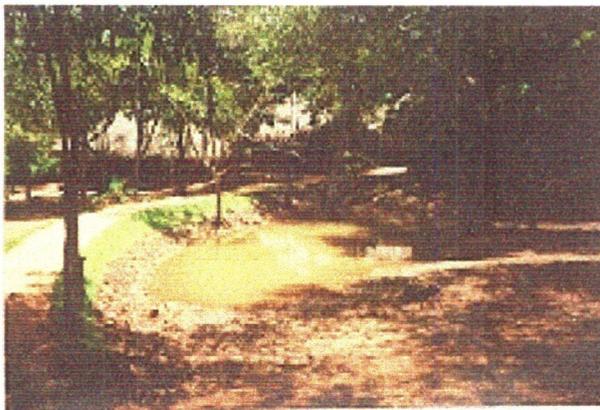


Figure 72 – gradual appearance of the village

Beyond the restaurant the lodges, which appear in close proximity (*figure –72*), with wide-open verandahs, make the visitor move towards the lodges immediately after the experience of the exposed sunlight in the open space. Here the architect has thus enlightened and enhanced the sudden change of the inside and outside environments and made the visitor feel deeply, both physically.

The reflected light, textured clay walls, doors and windows strongly enhance the spatial qualities of the verandahs making the strong visual relaxation. Both these physical and psychological comforts created within these verandahs (*figure –73*) make the traveler to sit and capture the spirituality of the immediate

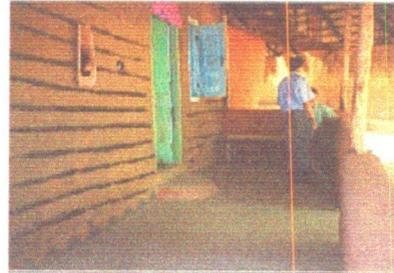


Figure 73 – power images created at the verandah



Figure 74 – highly elaborated enclosure plane within a lodge

surrounding, which was missed during the quick move to the lodge. Further the lodges, which comprise with one compartment in simple clay walls, visualize a typical traditional village house. The walls simply painted in white demarcated with the cow dung applied floor and the vibrant patterns created under the cadjan roofs by the reflected light make a strong sense of a friendly enclosure plane creating more visual comforts within the lodge.

(*Figure –74*) This is further elaborate with the traditional windows and doors, which are placed within the walls in a pleasing scale enhancing friendly architecture giving the immense sensuality of the place.

3.3.2.2 Using sustainable design methods

In any aspect the approach to sustainable design methods is to filter the adverse effects of out side environment as heavily as possible. This has often had a depressing effect on both in the exterior and interior of the built structure resulting in built products

existing in a very negative architecture that was obsessed with environmental physics, but provided very little amenity. But here at this resort after having realized that the need for sustainable products for eco tourism as use of simple materials, simple technology and little energy, the architect of the resort has made use of bio degradable materials found in that area with no chemicals and completely natural materials from coconut rafters, logs, planks, to cadjan and clay. Thus elaborating the sustainability of the traditional layout of the resort.

3.3.2.2.a Conserving energy

Energy is highly consumed in the production process of the materials and the construction process of any building. The built materials of this resort has significantly reduced the level of energy used mainly because of the use of traditional architecture of wattle & daub which conserves less energy. Further the use of solar energy (*figure 75*) systems thought looks artificial is extremely a positive method use to make use of the tropical sun.

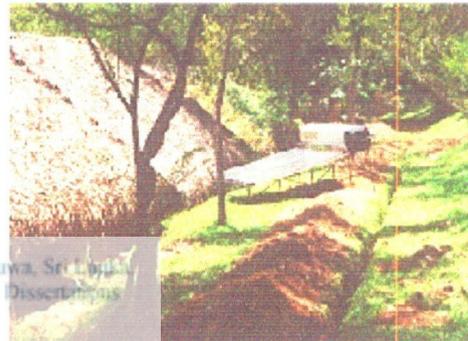


Figure 75 – using of solar energy for consumption

3.3.2.2.b Working with climate

The location of the resort in the dry zone with a hostile temperature of around 30 C through out the year has made the built product respond more to the “tropical sun” rather than the seasonal rains.

Thus the highlighted critical criteria of an eco friendly product which is to respond to the climatic conditions has been greatly taken in to consideration by creating long eaves within the traditional roof form, using wattle & daub structures which act as a strong barrier to control and absorb heat, using materials like cow-dung to control moisture

and insects during seasonal rains, but with minimum damage to the purpose of the resort of giving the sense and feeling of a tropical Sri Lankan atmosphere. But the built lodges as they face in all the directions a sensible orientation for the tropical sun has lost within the layout pattern. (Figure 76)

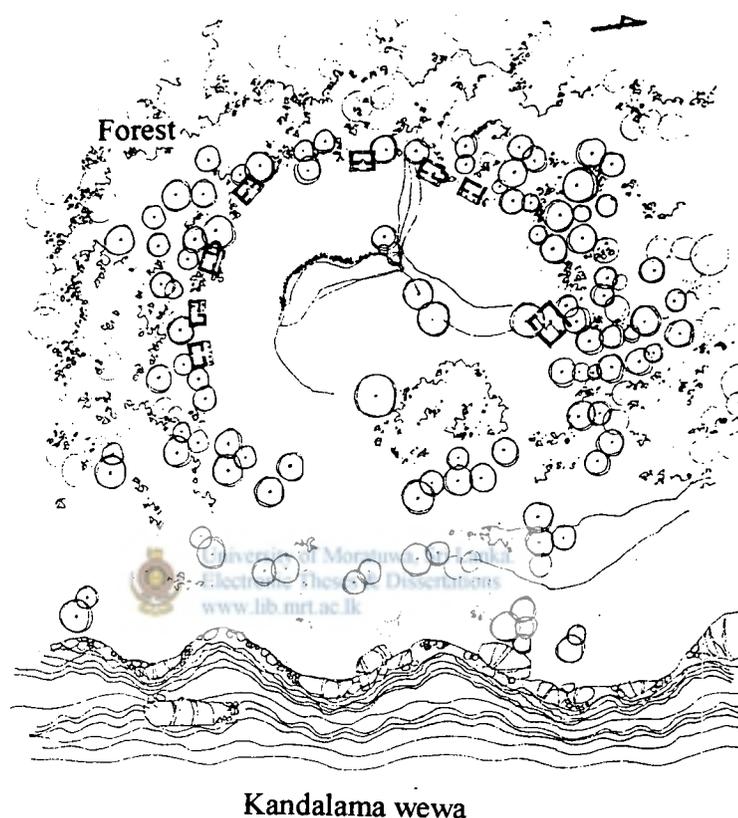


Figure 76 – layout of the resort

The characteristic feature of the resort is the cultivation of the vegetation in accordance with the seasonal rain patterns, which further enhances the respond to the climate even within the created landscape, merged in the natural setting.



3.3.2.2.c Minimum use of new resources

The traditional construction methods and the materials found in the architecture of the resort has significantly reduced using of new resources generating a more friendly atmosphere towards the environment the significant feature is that most of the doors and windows are used elements enhancing the strong interpretation of “reuse” of materials; but one which has given the eco lodges a peaceful environment that is therapeutic since most of the materials used produces certain resins and sap which are medicinal and which works towards promoting health of both mind and body ; a great facilitation which the tourist seeks in eco tourism.

Further the vegetable garden in the resort allows guest to pick their own lunch and dinner and have it cooked for them facilitating the visitor to be apart of the village activities as well as to experience the typical village atmosphere, the foods and the natural environment, which encourage surviving on their own resources. (Figure-77)

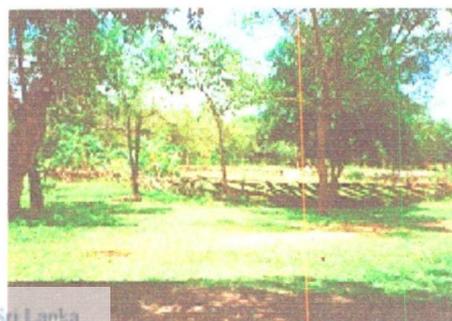


Figure 77 – cultivation for their own use, from the surrounding area

3.3.2.3 Application of the concept of carrying capacity

The concept of carrying capacity is one of which categorize the tourist product as an eco tourist architectural product. Here at Dambulla resort though the 10 numbers of built spaces are locater within twelve acres of extent enhancing “respect for site” the lodges are located in close vicinity to each other giving a visual sense of a sustainable resort, which gives the respect for the user.

3.3.2.3a Respect for site

Here too the limited number of built products has given the spiritual sensitivity of nature rather than over powering it. But in a deep observation it can be identified that some of the built structures as distortions of the continuation of the sensitive placements of the built products. *(Figure 78)*



Figure 78 – structures both visually and physically merged into the setting

But, further here at the resort the visuality of the eco lodges which emerge as if existed naturally on site, comparatively has been the most successful mainly because of using the essence of the traditional earth architecture which has the totality of the colour and the texture of the surrounding nature.



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3.3.2.3b Respect for user

The existing layout of the resort, though is congested is a typical traditional village layout merged in a forest. There the psychological aspect of a visitor to feel secured and protected in a forest environment is highly enhanced as the built structures are placed in close vicinity enhancing both the feeling of a community which interdependent with the nature and as a highly secured area. But this close vicinity and location of some of these built products has resulted in losing the spirituality in respecting to the site by the visitor.



Figure 79 – sense of the setting generated within the lodges using furniture

Though the interdependency of nature and the visitor is highly elaborated within the traditional built structures as they have not only used materials found from the surrounding for structural purposes but also as furniture and many other utilities even within the built structure, the extent of using glass and some sophisticated elements for service purposes (*figure 79*) has somewhat disturbed the rhythm of the eco tourist perception.



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Conclusion

Man is undoubtedly the species on earth who controls and changes the cycle of earth for his own benefits. Human activities generated towards the nature have become more increased since man wanted to seek the comfort ability of life rather than surviving on it. These interactions between man and nature have become more unsympathetic towards the nature thus creating a significant imbalance in the natural eco systems.

Considering the tropics, comparatively with a warm climate, enriched with exclusive natural eco systems which is now being significantly and unlimitedly experienced by the man thirsty for sensitive and comfortable relaxed environments thus has created these major environmental ills more distinctively. To avoid these negative impacts on the environment thus gave rise to the concept eco tourism, which contributes the people to gain a relaxed environment to smooth their sense, body and mind by experiencing the peaceful, calm and dust free nature, climate and culture more sensitive manner can be considered as one, which has still not been successful in achieving distinctive results in it totality.

Here too, architecture has become the major aspect, which physically intervene with nature. Greatly cause damages to the sensitive eco systems and creating of the imbalance in the natural environments mainly in the tropical environment is the damage, which the architecture in eco tourism can create. It is here that the architect's ability of creating built products, which are sensitive and sensible in other words **eco friendly architecture** towards the nature, exists. Thus the architect as the ultimate creator of the built products must significantly contribute to the ecology of the immediate environment as a whole, which responds to the environmental issues and the changing climate.

When considering the Sri Lankan context as the concept of eco tourism is rapidly increasing due to its rich tropical natural and cultural settings, it can also be visualized that the sustainability in this tourism has lost mainly by the lack of design understanding of eco friendly architecture. Thus the study as its subjected to make a comprehensive study of the sustainable eco tourist architecture in the tropical climates evaluating with eco friendly architectural perceptions it is revealed that an in-depth knowledge of its friendly approach sensitively be a cure for these environmental ills.

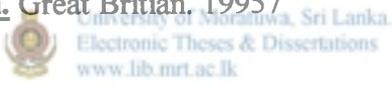
The comprehensive study and the comparative analysis of some architectural products which are evolved in natural settings highlighting closer attitudes of eco tourist architecture; the Ulpotha village which has more possibility and a trend towards eco tourism than the others, mainly because of its sustainable traditional built spaces merged within the nature creating a strong imaginability of a traditional tank fed village; one of which is scarce to be experienced. The significant interpretations of eco friendly architecture, the considerable achievement of the design principles of eco tourism, which can be observed here, enhance the possibility of viable eco tourism in the tropics. Thus highlighting the importance of the imaginability of a product as at the eco resort at Kandalama village though it elaborates traditional architecture, the weaknesses of the imaginability has made the sense of eco tourism not so strong like at Ulpotha. Further the Ella Adventure park, which has a totally different formation but entirely merged within the natural setting with the use of timber as a resource enhance the sustainability of physical interpretations which has not been gained as in others, thus as a whole visualize the sustainable approach which needs to be understood not as an entirely new one but as a practice to be developed more sensitively.



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Thus all what emphasize is the in depth understanding of eco friendly architecture which in return response in overcoming the weaknesses of adopting positive principles and move towards achieving and promoting successful eco tourism which stands in the threshold of the tourist industry in Sri Lanka.

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